



COST 358 Pedestrians' Quality Needs

Systems Approach

PQN Final Report - Part A: Introduction
and Conceptual Framework





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Pedestrians' Quality Needs

Systems approach

PQN Final Report Part A: Introduction and Conceptual Framework

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Preface

The COST 358 Pedestrians' Quality Needs (PQN) project aims to demonstrate the added value of a State-of-the-Art systems approach to the issue. Such an approach needs to be based upon a mature and robust conceptual framework. This framework is being developed in the context of my PhD study and the PQN project. It takes time and a lot of discussion with fellow experts to develop such a framework. This version will form Part A of the Final Report of the COST 358 Pedestrians' Quality Needs project. It serves as one of the inputs for the PhD thesis, which is planned to be presented in 2011.

The first version of the conceptual framework report, then called Conceptual Model, was presented in June 2006. It included conceptual contributions of Zuzana Simonova, Daniel Sauter and Willem Vermeulen. This version was discussed and commented on by a Dutch expert group during a meeting in August 2006 in Rotterdam. This first draft version was also used as background information for the Kick-off meeting of the PQN project in November 2006 in Brussels and for the development of research questions for the four PQN working groups.

Since then a number of successive drafts versions were made. They include additional conceptual contributions by Albert Manenschijn, Daniel Sauter, John Stoop, Willem Vermeulen, Willem Vlakveld, Bert van Wee, Shalom Hakkert, Ralf Risser and results from many discussions in the PQN Working Group 4 Coherence and Integration.

Rob Methorst

Voorschoten / Delft, August 2010

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Summary

People need to walk. The quality of their experience however can vary greatly and this in turn is known to directly impact on their decisions to choose to walk against other modes and the frequency, length, scope and enjoyment of their trips.

Walking is such a basic way of travelling that one tends to forget its importance. Walking can be seen as the lubricating oil of the transport system. Although almost everyone agrees that it is important to have pedestrian facilities, hardly anyone has it at the top of their list, except in public areas where there is a dominant economic or social reason to care for pedestrians, like shopping streets and malls, or monumental parks. It has become clear that policy development and implementation on the pedestrian issue needs a new impulse.

The Pedestrians' Quality Needs Project (PQN) has been established to innovate policy development thinking and to show how policy development can be taken to a higher level. The project aims to identify what people need for their safe and agreeable mobility in public space, to show the added value of a systems approach compared with sectoral approaches. PQN is informed by and build upon the research published by previous studies (including WALCYNG, ADONIS, PROMPT, Vulnerable Road Users and HOTEL). The project networks 20 countries and is supported by the COST office of the European Commission.

PQN objectives are:

1. Improve the understanding of how the public space, the transport system and the social, legal and political context interrelate with pedestrians' quality needs.
2. Advance the effectiveness and efficiency of future policy and research by developing a new and coherent system of concepts, theories and models which influence the quality and provision of pedestrian facilities.
3. Enable relevant organisations to work together to identify, prioritise, tackle and prevent current and future restrictions on the full potential for pedestrians by providing an accessible knowledge base and easy to use auditing tools.
4. Stimulate partners to innovate tools and disseminate knowledge that help to shed new light on the issue and stimulate a new enthusiasm to provide for safe and agreeable mobility.
5. Provide recommendations for further research.

The present report is Part A of the Final Report of the PQN project and concerns Introduction and Conceptual Framework. This report mainly concerns the first and the second objective. Part B – Documentation provides detailed insight in the research that four PQN working groups carried out within the context of the conceptual framework. Their activities were focussed on the third, fourth and fifth objectives. Part C of the Final Report entails an executive summary of the output of the PQN project.

There are three arguments for conducting the PQN study: societal relevance, scientific interest and opportunity. From a societal perspective a study of pedestrians' needs is extremely relevant, for it concerns everyone. Walking and sojourning in public space concern important aspects of life like mobility, accessibility, safety, health and sustainability. In many cases technological, spatial, social and economic developments stifle walking and sojourning conditions. The urgency of providing for walking and sojourning and the pedestrian's needs is growing. This makes it interesting and challenging to search for general quality determinants and to innovate research and substantiate policy making on the issue. Over the

years the climate for researching pedestrian issues has become increasingly favourable. There is a growing insight and feeling of urgency that 'something should be done'. The European Commission and national governments support the project.

A crucial factor for improvements in walking and sojourning in public space is the maturity of pedestrian quality policy. In some cases the level is 'pathological', where the authorities' attitude is: 'who cares as long we are not caught or sued'. In the majority of cases the attitude is reactive: 'pedestrian quality is important, we do a lot every time we get a complaint', or calculative: 'we have systems in place to manage all hazards'. In ideal situations authorities have a proactive or even generative attitude to the issue. In the latter the attitude is: 'pedestrian quality is a source of wealth and health'.

At the generative policy maturity level authorities are very much aware of the magnitude of the issue and informed about the options for improving quality for pedestrians. A systems approach particularly connects to this maturity level. Insight in its methods, output and outcome can serve as inspiration for authorities that want to move up on the policy maturity ladder.

In some fields, like transportation, road safety and health promotion, dedicated system approaches are tried. With regard to walking and sojourning in public space the common, reactive policies do not seem to produce much improvement. The PQN project argues that a new proactive and generative approach should be adopted to do better. As there is no recipe for a systems approach to walking and sojourning in public space, such an approach is developed and substantiated in the context of the project. The connected conceptual framework can also be used to gratify the researchers' curiosity regarding explanations for how the system works and to structure the project activities. It might even be relevant for other policy fields.

The PQN system approach features three interrelated dimensions: context, content and process. The organisation of the approach is featured by a systematic process design. The work within the process is directed at content, which concerns the pedestrians' needs and improving the system that supports walking and sojourning in public space. All changes in the system affect its environment and vice versa (context). The magnitude of the improvement of the situation for the pedestrian depends on the quality of the change process as well as the influences and reactions from the societal, physical and transportation environments.

The PQN systems approach process starts with setting general quality targets for walking and sojourning. The first step in policy development, which in principle does not have to be repeated in future processes, is to model the system: develop a conceptual framework. Based on the conceptual framework, and general insights and experiences with the system, requirements can be identified and formulated in a reference vision (second step). The next, third, step is to evaluate the actual state of the system, including assessment of the current features and a SWOT¹ analysis of the system. The fourth step is to explore options for improvement, followed by a final step: decision on interventions. Within this general process a number of sub-steps are discerned and substantiated within the project. As the systems approach is not yet implemented, the real effects of the approach cannot be assessed.

The process design serves as guiding principle for the substantiation of ideas on the PQN systems approach. The ambition was to cover the issue as comprehensively as possible, both with regard to the process and the content. Of course, there are always practical limitations to what can be achieved. After all, time, energy and budgets are limited. Choices

¹ SWOT = Strengths, Weaknesses, Opportunities and Threats.



had to be made, in this case depending on individual interests, field of expertise and organisational backing.

In the PQN conceptual framework the pedestrian system consists of three layers. In the most abstract layer the pedestrian system is a 'black box' that gets input from its environment and delivers output to the environment.

In the second layer the pedestrian system is a 'white box', showing its elements and internal and external relations. The elements in the system are 'the pedestrian', 'the social environment', 'the physical environment' and 'transportation'. The pedestrian is placed central. All elements interact with each other as well as the environment. It concerns an open, complex open system, which changes constantly under influence of internal forces as well as reactions to stimuli and changes in the environment.

The third, most concrete layer of the system model describes the pedestrian's behaviour and its (general) determinants at the lifestyle, strategic, tactical and operational activity levels.

Although the above pedestrians travel & sojourn systems model can help detect and describe fundamental relationships, in practice such a model is not very useful for surveying options for change and potential interventions and determining what 'inputs' to the system should be recommended. A common problem in policy making is that one tends to confine one's search for solutions to one's field of expertise. Thus most engineers focus on technical solutions within their field of expertise only and often do not include other engineering fields, education or enforcement solutions that alone or together could provide a much more effective solution to the problem. Likewise policy makers, particularly on the local level, concentrate on short term options and often fail to look at the larger context, long term trends and the need for more fundamental changes.

As a tool for open minded policy development, covering options for interventions more fully, the Pizza model was developed. Its aim was to form a source of inspiration for devising *comprehensive* transport, sojourning and road safety interventions. Basically it is a picture-checklist. It is meant to help the policymaker to check whether all options are included in the desired comprehensive approach.

Based on the Needs-Opportunities-Abilities (NOA) model² determinants of pedestrian behaviour are explored. Needs, wants and motives are related concepts. According to Steg & Vlek Needs and Abilities underlie a person's search for Opportunities; Needs and Opportunities shape motivation to perform; Opportunities and Abilities determine behavioural control.

With regard to pedestrian needs several classes of needs are distinguished: homeostatic or subsistence needs, psychological needs, aesthetic needs, social needs and public or political needs (Lapintie, 2008).

For classification of abilities Fuller's model on task demand – capability – competence is a useful tool. It shows that task demands for walking and sojourning depend on one's general competences: personal characteristics, training, experience, knowledge, skills, insight and attitudes, and that the effectiveness of these competences are limited by temporary task capabilities like physical and psychological condition, stress, illness, distraction, fatigue, psycho-active substances.

Opportunities come from the pedestrian's environment. To be relevant, opportunities have to be recognised as such. People get used to having certain options and expect to have them 'indefinitely'.

² L. Steg and C. Vlek, 2008

With regard to intervention program development, some organisational preconditions are essential: awareness, willingness to act, opportunities, competences and skills and lastly, an adequate implementation organisation.

The so called Cascade strategy of interventions is the key to successful improvement of the system. Such a strategy starts with focus on policy preconditions. When all options on this issue have been materialised, attention can be focussed on travel and sojourning preconditions, which set the stage for lifestyle and strategic level activities by pedestrians. When there is no more room for improvement, at this level, the third step is to attend to latent problem causes. Lastly, again after all opportunities for higher order solutions have been taken, attention can be focussed on traffic and walking behaviour on the spot.

Policy development using a systems approach will result in a multi-level, comprehensive and integral improvement programme proposal. Promising interventions, which can be expected to improve walking and sojourning conditions, need to be put in a wider context. They need to be evaluated as a package and tested for potentially undesirable side effects, negative effects on higher order goals, such as counter-actions by other stakeholders etc. To be successful, the proposal should not only take into account the interests of pedestrians, but also those of other stakeholder, particularly the ones that might suffer consequences. In general it will be a big plus if the program connects effectively to other, accepted policy plans for economic development, urban planning, transport and mobility planning, or planning for the environment, safety and health.

Simplified, the PQN system approach is build on three principles:

1. Start with the pedestrian
2. Analyse of the system comprehensively
3. Apply the Cascade principle for policy development and implementation.

Comprehensive coverage of the issue means that the PQN project looks at the issue from three perspectives, the functional perspective, the perception perspective and the durability and future prospects perspective:

1. *Functional perspective:*

Functionality or usage value, relates to what is being offered and to intrinsic quality supply. It concerns looking at the system from the 'head' and searching for 'facts', thus covering first order³ needs and wants. This perspective particularly covers the experts' perspective and focuses on the supply side of facilitating pedestrian activity.

2. *Perception perspective:*

The perception perspective relates to what is being requested and to subjective quality needs. It concerns looking at the system from the 'heart', including attitudes towards and of pedestrians, thus searching for 'opinions' and covering second order needs and wants. On the one hand this perspective covers the pedestrians' perspective and focuses on the demand side of facilitating pedestrian activity and on the other hand on public and political opinions that influence policy making and implementation on the issue.

3. *Durability and Future Prospects:*

Whilst the functional perspective and the perception perspective are mainly static⁴ quality descriptions, the durability and future prospects perspective refers to a dynamic

³ according to Rumar (1999) there are three kinds of problems that need to be dealt with: first order problems, that can be identified from available data, second order problems, that come forward through dedicated studies and third order problems that are almost totally hidden.

⁴ indication of the situation at a given moment



perspective and so called third order needs and wants. Durability⁵ is, like user value and perception value, a relative value and depends on current qualities, future social values and future use of the physical environment and transport system. Historical developments can be described in 'objective' terms, but assessment of future prospects and durability are, because of the uncertainties involved, by nature at best expert opinions. Because interventions can have substantial impact on future developments, this kind of assessment is needed for balanced decisions that take into account, as well as we can, the interests of pedestrians in the future. It goes without saying that this perspective particularly covers the experts' perspective.

In order to get a complete and balanced picture, the three perspectives need to be collated into a fourth perspective: the integrative perspective, that seeks to find ways to balance out the different realities of the 3 'longitudinal' perspectives into coherent policy and research recommendations from the perspective of a generalised pedestrian. Therefore, in the PQN project there are four working groups, each taking up one of the four perspectives.

⁵ Durability and robustness are strongly related concepts. In statistics robustness is defined as insensitivity against small deviations in the assumptions. Aspects are system performance and loss of function, collapse of powers with overall consequences that are scenario dependent, robustness and vulnerability, from component design to systems design (MoU of COST TUO601, 2006).



1 Introduction

'The fate of common things is oblivion'

1.1 Preamble.

This report is concerned with walkability⁶, including the needs of pedestrians and the possibilities offered by a systems approach to take care that these needs are facilitated adequately, both in the short and longer term⁷. The focus is on everyday walking in public space, in the European situation. In this report a pedestrian is anyone who walks or stands stationary, including those who need walking aids, wheel chairs and other simple vehicles that are absolutely needed for their basic movement in public space. So, vehicles and technical means that are used for fun and sports, like skates, toy scooters and tricycles⁸, although in legal terms these means are seen as 'pedestrian', are not included in this study.

A pedestrian thus is a person travelling or sojourning on foot, whether walking, running, playing, standing still. In modern times, the term mostly refers to someone walking on a road or footpath, but this was not the case in ancient times. With the advances of motorisation of society the pedestrian is banished to the side of the road or to dedicated infrastructure. In principle one can walk anywhere, both in public and private space, provided the space is accessible and passable (<http://en.wikipedia.org/wiki/Pedestrian>).

As a species, humans *are* pedestrians. It is true that other animals walk, too. What makes humans different from other species is that they walk erect (Nicholson, 2008). In principle everyone is a pedestrian, but one can perform other roles, like car driver, bicyclist, passenger as well. Humans have a need to have an identity and to feel special. Being able to walk is such a common thing that very few people use it for defining their identity (Steenart et al, 1998).

For operational functioning people need to pay attention to special conditions only (Steffen, 1975). It is clear that the human brain would be overstressed if all common things would have to be given attention. This helps to explain why walking, although crucial, is not in the centre of attention. The self evident feasibility, relatively low conspicuousness and low costs of walking are additional arguments. Unfortunately the same mechanism makes pedestrian problems 'invisible' and deniable. What normal person wants to admit that he has problems coping with such a common task? This general attitude makes it rather difficult for providers to find out what needs really are essential and what is needed to facilitate walking adequately. Many 'hidden' interests are represented by Non Governmental Organisations (NGO's) that highlight concealed and dormant needs and demand political attention. In most countries however the interests of pedestrians are not supported by influential and powerful groups. From discussions amongst experts in the PQN and OECD Pedestrian Safety, Urban Space and Health research groups it appears that governmental attention for these needs is still rudimentary, both on the local and national levels.

⁶ Walkability describes overall walking conditions, in the widest sense. Walkability takes into account the pedestrians' abilities and competences, quality of pedestrian facilities and services, roadway conditions, land use patterns, community support, security, comfort of walking and connectivity to the transportation system.

⁷ Definitions of concepts used in this report are described in Appendix 1 Glossary.

⁸ This also concerns new trendy vehicles like the Segway; when it is used as walking aid for persons with limited stamina, of course, an exception is made.

Pedestrian needs vary widely. There are many different needs and needs vary from person to person and from situation to situation. Some of these needs are quite common and others so specific or unique that it is probably not reasonable to expect that society is prepared to satisfy those needs at any expense. In this context the Design for All (D4A) principle sets the stage for this study⁹. In D4A needs are seen in relation to abilities and competences; according to this principle the optimal policy regarding satisfaction of needs is to provide for the vast majority of public space users. This can best be done by concentrating efforts on those that have difficulty in coping with the system; if the system provides for them, also much more able persons are automatically seen to (European Institute for Design and Ability, 2004)¹⁰.

The COST 358 Pedestrians' Quality Needs project Final Report is made up of three parts:

- Part A. Introduction and Conceptual Framework.
- Part B. Documentation, including the detailed results of the PQN research projects.
- Part C. Executive Summary.

The report in front of you is Part A of the report series. It focuses on the theoretical and generic aspects of the issue. It does not go into detail regarding specific problems, strategies and interventions for stakeholders. It aims to provide a general framework and policy recommendations on the European and national levels.

1.2 PQN project objectives.

The Pedestrians' Quality Needs Project (PQN) has been established to innovate policy development thinking and to show how policy development can be taken to a higher level. The project aims to identify what people need for their safe and agreeable mobility in public space, to show the added value of a systems approach compared with sectoral approaches. PQN is informed by and build upon the research published by previous studies (including WALCYNG, ADONIS, PROMPT, Vulnerable Road Users and HOTEL). The project networks 20 countries and is supported by the COST office of the European Commission.

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4. Stimulate partners to innovate tools and disseminate knowledge that help to shed new light on the issue and stimulate a new enthusiasm to provide for safe and agreeable mobility.
5. Provide recommendations for further research.

⁹ In Part B of the PQN Final Report – Documentation, in the section of Working Group 4 results D4A will be discussed more extensively.

¹⁰ The principle compares to the current common practise in process industry to base quality control on variance in quality of products and no longer on the degree of deviance from the average quality of a product.



1.3 Why this study?

In general there are three powerful arguments for conducting a scientific study: societal relevancy, scientific interest and opportunity. All three apply in this study. A hint of relevancy was already given in the introduction. In this paragraph the arguments will be elucidated.

a. Societal relevancy of a study on pedestrians' needs and qualities

From a social perspective, a study of pedestrians' needs is extremely relevant, for it concerns everyone, regardless of gender, age, origin etc. Knowing what the needs are is important for many people and organisations. On the one side it seems increasingly difficult to provide adequately for the great variety of needs, which is a problem that needs to be solved; on the other side, walking is a potential solution for many problems, like obesity, environment, the oil crisis, security or public safety etc. There are also economic reasons for pampering pedestrians. Pedestrian quality produces economic value and lessens societal costs. Litman (2003) finds that providing for pedestrians most of the times is significantly cheaper than providing for cars, public transport and even bicycles. He concludes that solving pedestrian problems is probably almost always cost-effective, not in the least because it supports practicality all other modes as well.

The fate of common things is oblivion¹¹. Walking is such a basic way of travelling that one tends to forget its importance. One can forget its importance when the facilities are available and when the available facilities are adequate for a 'normal' person. Only when one becomes (temporarily) handicapped, one discovers how crucial it is to be able to walk and that quality is not as good as one would expect it to be.

Walking can be seen as the lubricating oil for the transport system¹². Without it the system cannot function. Walking and pedestrians, however, are not associated with commercial profit. It's not a multi-billion dollar industry like the car industry that is capable of generating large sums of money for research and development. Although there is agreement on the importance of walking for the functioning of the transport system, research on walking and pedestrians' quality needs has proved to be commercially unattractive. Providing for pedestrians is universally perceived to be a public task, thus needing governmental attention and funding.

Although almost everyone agrees that it is important to have pedestrian facilities, hardly anyone has it at the top of their list. Most times other (transport) issues seem to be more urgent and waiting for action. The general public sees taking care of pedestrians as a public task and does not feel compelled to cry 'wolf' from an underdog position (who wants to be recognised as vulnerable?). Central government sees it as a local authorities' task. On the local level pedestrian issues have to compete with other important transport issues. Providing for pedestrians ranks low, except in public areas, like in shopping streets and malls or monumental parks, where there is a dominant economic or social reason to care for pedestrians.

¹¹ I used this statement for post-graduate courses on pedestrian policy development. In Dutch it is: 'Het lot van het gewone is dat er geen aandacht voor is.', literally the translation is: the fate of common things is that they do not get any attention.

¹² Statement by Ralf Risser during the ICTCT Young Researchers Course in Riga, 2008.

Because of increasing car dependency and consequent land use changes, perception and social changes, the nature of walking has evolved (Voetgangersvereniging, 1993; Steenaert et al, 1998). Door-to-door walking diminishes, whilst walking to and from other modes increases both in number of trips and in average distance. In total, the amount of walking per person will decrease somewhat, but due to population growth the total distance travelled on foot will stay approximately constant. An average person walks approximately 200 – 250 kilometers per year, which is 600 to 700 meters per day on average (estimated on Dutch mobility data). This means some 15 minutes of walking per day (Steenart et al, 1998, Methorst, 2010).

Generally multi-modal form of walking is statistically less visible than mono-modal door-to-door walking¹³, creating the false impression that walking becomes less important. This false impression is further supported by a less intensive use of pedestrian facilities because more land is 'colonised' and the number of persons per housing unit decreases: this results in fewer pedestrians per square meter walkway.

Almost all countries will have to deal with an ageing population (OECD, 2001¹⁴). For policy development regarding walking this has consequences:

- The elderly walk more than other groups. For the elderly the walking environment poses specific problems; they require better quality pedestrian facilities.
- With the ageing of the population public expenditure will rise. It will be much harder to find adequate budgets for pedestrian facilities¹⁵.

Health issues are becoming universal. For modern humans exercise is no longer a natural part of everyday life. Technical devices, like cars, elevators, electric bicycles made life easier, but pose new problems as well. Walking is a solution to many health problems (WHO, 2009). In the health community obesity is seen as a major problem, which needs to be tackled soon. Much awareness communication is directed at getting this message across to the general public. The WHO message is: 30 minutes of exercise can help prevent health risks; walking is a simple and very feasible form of exercise that everyone can and should take up. Furthermore, in many European countries Nordic Walking has become a very popular form of exercise amongst middle aged and older people, particularly women.

Promoting walking is an effective strategy to keep the population healthy as well as a cost effective measure to counteract typically occidental diseases like cardiovascular and respiratory diseases, obesity, even cancer, ageing deterioration included. Even mental health related to environmental aspects and lifestyle, is positively influenced by regular walking while car use and hours spent in traffic jams represent an important stress factor, influencing both mental and physical wellbeing (http://www.who.int/topics/physical_activity/en/).

Conditions for pedestrians vary widely from country to country. There are differences in climate, in spatial conditions, quantity and composition of traffic, legal position, culture regarding walking and presence in public space etc. This asks for different solutions for different countries.

The position of the pedestrian in society and in the transport system changes over time (Voetgangersvereniging, 1993). In West European countries the current situation for pedestrians is the result of a gradual adaptation process over many decades. In the Central

¹³ In most statistics only door-to-door walking is shown; walking to and from other modes is neglected.

¹⁴ The OECD working group was led by John Eberhart and Liisa Hakamies-Blomqvist. Liisa's expertise on the elderly's walking abilities can be considered most relevant and influential for the current study. The author took part in the working group and learned a lot from her.

¹⁵ Public expenditure for pensions, health, transport and many other services will rise. The elderly will be more car-dependent as well, causing demand for higher design standards for car traffic as well. All these foreseeable demands will compete with the urgent needs of a relatively small group (Methorst, 2005: 6.1% of the population in NL in 2000, 9.4% in 2030) of pedestrians that have mobility difficulties.



and East European countries the process of growth in the number of cars and car use is much more violent and recent. Adaptation in such situations is more difficult and may result in much more serious problems than experienced in the 'old' already highly motorised countries. This study can help to provide those countries with knowledge that will make it easier and more efficient to deal with such problems.

In Europe motorisation did not yet lead to a bipartition of society where walking as a common travel mode is no longer feasible for 'normal' persons, although for some groups in specific situations, like school children, independent walking may have become problematic¹⁶ (Vermeulen, 1998). In mobility and safety forecasts the observed trend of up-scaling of catchment areas of essential services, increasing car dependency and individualisation may lead to a bipartition of society (Methorst & Van Raamsdonk, 2003). Better pedestrian facilities might compensate for that.

In the western world, including Central European countries, the free market philosophy is becoming dominant. Policy is focussed on economic growth, which is attained by facilitating market participants, not by governmental guidance. Governments support concentration of production and consumption. Transport is seen as crucial for economic growth. This way of thinking encourages up-scaling, which in itself, because of growing average distances, is destructive for walking. In policy reasoning, as yet walking plays only a marginal role. Leading politicians agree that social issues are best solved through a free operation of the market and that the governments' role is limited. In relation to this, governments retreat from policy sectors where they were once the dominant force. In such a climate, when promoting interventions for improving walking conditions, one needs particularly well founded (economic) arguments. There are industries and thus large economic interest behind the car that drive the interest-in-cars process because they have economic advantage of this. No industry has – on first sight – economic interest in marketing walking. Since the citizen is assigned a larger role in creating adequate living conditions in their neighbourhoods themselves, effective low threshold tools are needed to substantiate this new role. This study can help providing such tools.

b. Scientific interest of doing a pedestrians' qualities study

The urgency of providing for walking and the changing pedestrians' needs is growing. Trends like the ageing of the population, increase in traffic and car use and growth of goods transport, can be expected to have consequences for the need for adjusted transportation and safety facilities and preconditions, particularly those for walking and sojourning (OECD, 2001). The number of scientific publications on pedestrian issues however is substantially less than for car traffic issues. A quick search in Google Scholar delivered an average of 58,400 hits for pedestrian issues, whilst car issues yielded an average of 1,431,000 hits¹⁷. Relative to research on roads and vehicles, research, policy making and implementation concerning the safe mobility and quality of life of pedestrians however is a relatively new, emerging issue, which was rather neglected in the past. Knowledge on pedestrians' needs and requirements is still scarce. In each country there are only a few academic level experts on the issue¹⁸.

¹⁶ Like children who are no longer allowed to go to school by themselves, or women who do not dare go out after dark.

¹⁷ Internet search carried out on the 3rd of February 2010.

¹⁸ In the Netherlands for example some 20 researchers and national level policy makers deal at least half of their working time with the walking, pedestrians and sojourning in public space; for car and vehicle traffic issues such a count will amount to several thousands researchers, policy makers and advocates at universities (Delft, Eindhoven, Breda, Leeuwarden), TNO-Applied Science (sections Automotive, Human Factors), governmental bodies (ministry of Transport, Rijkswaterstaat, KiM, provinces, regional traffic and transport authorities) and interest groups like ANWB, RAI-BOVAG, TLN.

The expected future developments and relative low numbers of publications on the issue make the pedestrian a challenging and probably rewarding issue to research, particularly regarding general quality determinants for walking and to innovate research and substantiate policy making on the issue.

Table 1 Hits in Google Scholar – Number of publications (February 2010)

	Pedestrian	Car	Vehicle
Needs	107,000	2,360,000	1,240,000
Traffic	18,500	1,110,000	256,000
Safety	75,800	2,000,000	536,000
Mobility	34,800	576,000	247,000
Accessibility	37,700	547,000	155,000
Health	70,500	1,800,000	1,050,000
Quality	80,800	2,170,000	2,250,000
Environmental quality	41,700	886,000	992,000
Total	466,800	11,449,000	6,726,000
Average	58,400	1,431,000	841,000
Relative number of hits compared to hits for pedestrian issues	1	24,5	14,4

Most of the pedestrian research done up till now focuses on urban design, pedestrian safety or the spatial or travel needs of specific groups like children, the elderly or the handicapped. In the majority of these studies the central issue is not the pedestrian or his needs, but urban quality of a town centre or shopping area, the need to improve road safety or mobility of the handicapped in specific situations. In other words, research has a limited scope, little is done to get an overview and to start a more comprehensive approach regarding general pedestrian needs. There are however some trendsetters and advocacies, like WALK21, the Highway Safety Research Centre of the University of North Carolina (USA), the Victoria Transport Policy Institute in Canada and the Land Transport New Zealand.

Some completed European research projects started to deal with the issue of pedestrian needs and made it possible to get some grip on the topic. The difficulties due to long neglect, however, are so substantial that a co-ordinated research approach is needed to build on the available knowledge and further to develop the insights gained in earlier projects in order to make a difference in towns and villages in Europe, and elsewhere (COST, 2006).

Within the urban planning sector there is a movement with a long-standing tradition of attention to pedestrian-friendly design¹⁹. This is inspired by the fact that qualities or deficiencies of the physical environment are experienced more intensely by pedestrians than by other persons passing by in cars or even on bicycles. Classic studies are 'The image of the city' by Kevin Lynch (1960) and 'Traffic in towns' by Colin Buchanan (1963). In the recent COST Action C6 'A city for pedestrians: policy making and implementation' (Final report 2002) the position of the pedestrian within the urban environment and the State of the Art were highlighted. The COST Action C11 'Green structure and urban planning' (Final report 2005) offers further insight into pedestrian friendly design.

In the 90's, in many countries there was a rise in attention for sustainable transport. In this context effort was put into the promotion of walking and cycling. Guiding studies on the European level were the EU projects WALCYNG (How to enhance WALKing and CYcliNG instead of shorter trips and to make these modes safer; Final report 1998) and ADONIS

¹⁹ This is not a mainstream movement, however. In most urban planning studies pedestrian friendly design is not the central issue.



(Analysis and Development Of New Insights into Substitution of short car trips by cycling and walking; Final report 1999) followed by research on walking in FP5 “City of Tomorrow and Cultural Heritage”, the so called PROMPT study. Furthermore, in many countries handbooks on pedestrian facilities and facilities for the handicapped were published (see for example Hendriks et al, 1998 for the Netherlands, Stuurgroep ‘Voetgangersvoorzieningen’, 2002 for Belgium and Hughes, 2007 for New Zealand).

In medical research reports it is pointed out that medical doctors increasingly prescribe exercise instead of medication; studies with regard to the ageing of the population reveal that a connective, convenient, comfortable, conspicuous and convivial walking network will become a crucial factor enabling the elderly to grow old in place. Within the integrated framework approach by THE PEP (Transport, Health, Environment – Pan-European Programme) new research is being carried out.

Although there are many good examples of pedestrian friendly streets or areas, the general situation and context is far from ideal and not automatically getting better. The good examples are ‘islands of quality in a sea of misery’. Based on the success of the bicycle approach and Sustainable Road Safety in the Netherlands (Weijermars & Van Schagen, 2009), one can conclude that a more fundamental approach, which also takes strategic targets and social and political trends into account, is needed. With regard to such a systems perspective of the quality needs of pedestrians there are gaps in current knowledge.

For motorised traffic, system thinking²⁰ has become more or less the standard. Whereas in the old days, policy making was purely reactive (‘we have a problem and we want to solve it’), nowadays the aim is to plan a flawless *system*, where traffic can move as safely and freely as possible²¹. Research based policy frameworks like Sustainable Road Safety in the Netherlands and Vision Zero in Sweden are examples of this new direction. The JRTC of the OECD and ECMT have a working group named Achieving Ambitious Road Safety Targets that published a report on the state of the art of safety management (OECD/ITF, 2008).

For pedestrians, however, system thinking is music of the future. Most public space and transport authorities do not (yet) recognise the importance of systematically meeting pedestrians’ quality needs. Research and traffic engineering are still largely confined to specific problems. Town planners and architects generally concentrate on aesthetics and investment costs, but generally do not think in terms of functional or Universal Design (design for all). Contributions from disciplines like psychology, sociology, philosophy, ergonomics, history, geography and law are still rather rare.

In relation to systems thinking, at present, knowledge on the pedestrian issue is fragmented, incomplete and to a large extent outdated. Statistics do not present a comprehensive picture of walking, its benefits, strengths, weaknesses, risks and opportunities. Most basic research was done decades ago, in situations that differ greatly from current situations. In systems terms there is no overview.

For the car network, systems-thinking is commonplace. There is continuous insight in traffic flows and incidents on main roads; traffic flow is managed continuously, with help of modern technology; human factors are a vital part of systems management; every road authority uses comprehensive models for assessing performance quality etc.

²⁰ In section 2 Systems approach will be explained and illustrated

²¹ Thus systems approach does *not* focus on fighting accidents, but on influencing risk factors within the process. The work is aimed at optimizing the process and reaching multiple targets: safe, healthy, agreeable mobility for all, ‘ageing in place’, community development etc. Knowing the citizen’s *needs* is a prerequisite for an effective approach.

Indeed, there is a great challenge to substantiate and innovate scientific knowledge on pedestrian needs and bring it to a knowledge level comparable to that of the car system. The Pedestrians' Quality Needs project is one of the first comprehensive pedestrian system studies.

c. Opportunities for doing a pedestrians' qualities study

Over the years the climate for researching pedestrian issues has become increasingly favourable. In some political and social arenas increase of car ownership and car use is no longer associated with progress and placed on a pedestal. In most countries, because of the negative side effects, alternatives to car use are assessed and promoted. The crucial role of walking is recognized. Walking is discovered by technicians and 'the market'. For example, Information and Communication Technology has discovered the pedestrian. In the 90-s simple detection and switching devices for forcing green for pedestrians at traffic lights, as aids for the handicapped, were introduced. Some technically sophisticated pedestrian crossing facilities have also been developed (Tan & Zegeer, 1995, SWOV, 2009). These devices are not yet a great success, but they were the first signs of the new ways. Lately GPS navigation devices for pedestrians have been introduced at fair prices. Now the mobile phone is at the heart of many new ICT applications, which will become very useful for supporting tactical level tasks of pedestrians.

Time is now ripe for a comprehensive study. There is abundant support in the scientific and political world for a comprehensive approach to the issue. In road safety policy the low hanging fruit has been picked, some road user groups, particularly pedestrians and bicyclists, have not profited equally. There is a growing insight and feeling of urgency that 'something should be done' (Department for Transport, 2000; Ministerie Verkeer en Waterstaat, 2007).

With regard to the present study, circumstances were as follows. In 2000 the Dutch Pedestrians Association merged with two other road safety organisations. As it happens in many mergers, some of the staff saw opportunities to improve their situation elsewhere. Two key researchers were transferred to the Dutch Transport ministry's AVV Transport Research Centre (now called DVS Centre for Transport and Navigation).

In 2001 the Dutch Ministry of Transport and Public work commissioned a study on establishing a knowledge base for the development of an integrated and comprehensive systems approach regarding vulnerable road users. This study resulted in a report by AVV Transport Research Centre; currently policy development is under way. Within AVV it was felt that the accumulated knowledge on pedestrian issues should be properly documented and advanced with systems theory and kept for future generations of policy makers. A comprehensive study which could also culminate in a PhD thesis was thought to be a good option.

In 2004 the International Co-operation on Theories and Concepts in Traffic Safety (ICTCT) decided to study pedestrian issues; in 2005 a joint project scheme was drafted and received enthusiastically. It proved that a large number of researchers were interested in joining up. The initiators also assessed that communication would be a key success factor. Therefore they got in touch with the WALK21 network organisers, to form a comprehensive and effective alliance for debate, dissemination and communication of the research results.

Because of the large number of potential partners who were interested, it became apparent that some organisational and budgetary framework was needed. The most suitable framework seemed to be the EC COST framework, where participants could be funded for their travel and meeting costs, but no commissioning relation (and subsequent time



consuming administrative ties) applies and the participating countries would have to take care of their own financing for associated research work. A project proposal was drafted, which again was received well. Within a month of the Call for participation some 25 institutions in 16 countries indicated their interest to sign the Memory of Understanding, which would be the foundation for the COST 358 project. Currently (August 2010), the count is 47 research organisations in 20 countries.

In most countries there is no critical mass for a general interdisciplinary systems approach study on this issue. Although there are many researchers and policy developers interested in the issue, as yet it is difficult to get joint research and policy development funded nationally. A practical solution is to join forces internationally and benefit from individual qualities. COST offered an effective and - above all - efficient framework for international and interdisciplinary research. Since there are not many professionals working on the issue, the joining of forces also reduces chances of duplication of research. A COST Action implies a less heavy administrative burden than a Framework Programme project; this is a favourable condition for researchers wanting to join the project.

One of the basic factors in effectiveness of dissemination is credibility of the source. A COST Action ensures that State of the Art knowledge will be disseminated and that the recipients attach credibility to the source of information, thus facilitating and stimulating more and better local interventions, based on scientific evidence.

The global policy development organisation OECD²² and the ITF²³ and their supportive body (JRTC²⁴) decided to install a working group on Pedestrian safety, Urban Space and Health (Programme of Work 2007-2009). The group will assess the state of the art policy making regarding pedestrians and will also involve identifying key factors, benchmarking, improvements and conclusions regarding measures on the national level. This project started in 2008 and is completed in 2010. The COST 358 PQN project was a source for this action.

1.4 Maturity of pedestrian quality policy

Although individual pedestrians clearly benefit from a high quality pedestrian environment, creating and improving quality is outside their span of control. Policy is made and implemented by organisations. For most people walking is not (much of) a problem on the individual level, but it can be argued that it is a collective problem. On the city, regional and national level, there are substantial numbers of people with limited mobility and victims of accidents. In this respect the pedestrian issue encompasses road safety, environmental problems, security, health and social issues.

Within organisations, policies are developed and implemented by 'common' individuals. The majority of policy makers and politicians are males between 30 and 60 years of age, having higher than average education and income, better than average fitness and health, and most often use a car for daily transportation. They themselves do not need to walk much and when they walk, most of the times they expect and experience hardly any serious problems. As this is also true for research programmers, research co-ordinators and top researchers in the relevant transport and urban development fields, this helps to explain why the pedestrian issue is not (yet) high on the policy agenda and that real pedestrian quality policy culture is a rare phenomenon.

²² Organisation for Economic Co-operation and Development

²³ International Transport Forum, successor to European Committee of Ministers of Transport ECMT

²⁴ Joint Transport Research Centre

With regard to Safety Culture, Flemming (1999) and Hudson (2001) made some interesting observations that are relevant for the pedestrian issue as well. They identify a number of levels of maturity in Safety Culture and they conclude that it is still a long way to the top. In Figure 1 Hudson's and Flemming's ideas on the evolution of safety culture are combined and adapted to the pedestrian issue.

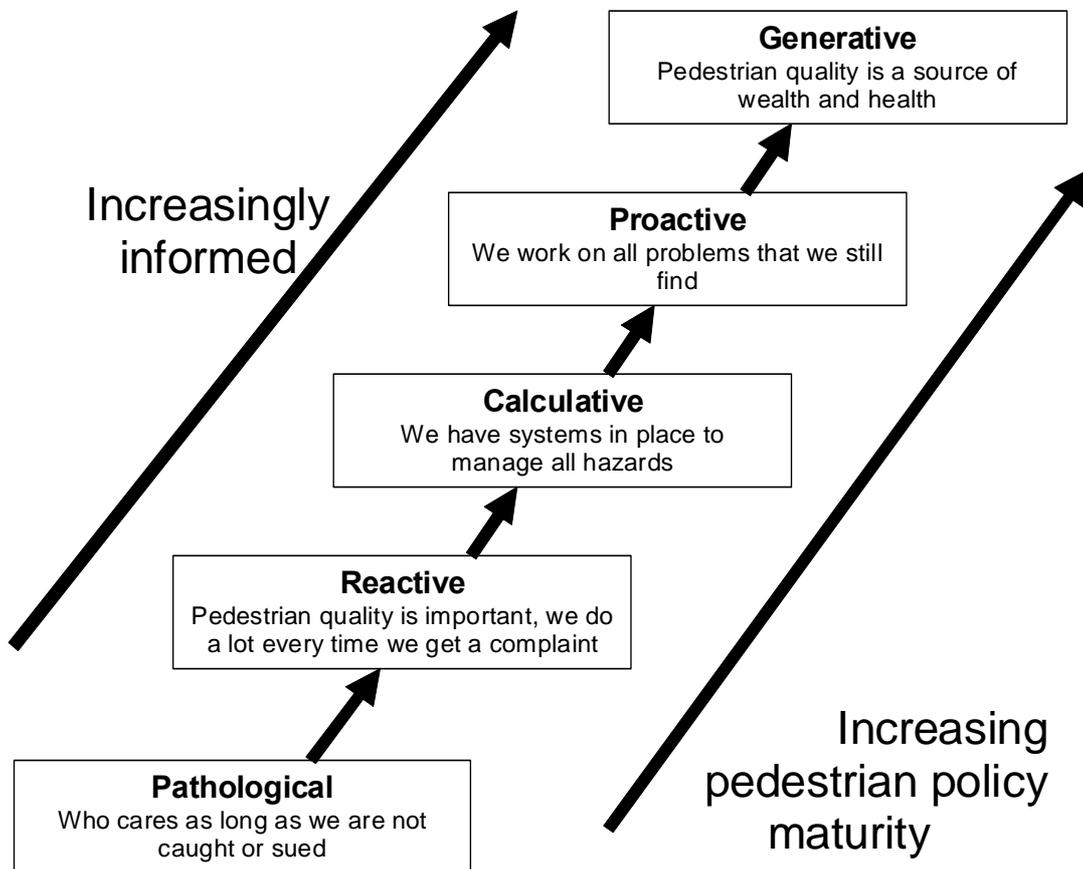


Figure 1 Pedestrian quality policy maturity (adapted from Hudson and Flemming)

Based on Hudson's typology (Hudson, 2001; Gordon & Kirwan, 2004), the stakeholders' pedestrian policy quality can be distinguished along a line from pathological to generative²⁵:

- **Pathological**: the organisation cares less about pedestrian quality than about being caught or sued for malpractice. At best, staff, management and politicians see the pedestrian issue as an *emerging* problem. At this maturity level the organisation is not interested what others (the media) think about the organisation's attitude and does not feel the need for acquiring information and information management. The general attitude to safety and quality is characterised by: 'Of course there are accidents and other problems. Using public space can be dangerous and we live in an imperfect world. Fine the idiot that had an accident.' In general a junior employee will be assigned to solve the problem at hand with minimal resources. Available handbooks and 'best professional judgement' are used to tackle problems that the organisation is confronted with.
- **Reactive**: the organisation looks for fixes to problems that were reported by citizens or in the media after they have arisen. Administrators pay lip service to the importance of the issue but do not formulate targets: 'We are serious about pedestrian safe mobility, but

²⁵ A number of typifications are directly cited from Hudson's article 'Safety culture, the ultimate goal'.

why don't *they* obey the rules?' Staff and management focus on *managing* the problem and think that there is nothing better and anyone who claims better performance probably is lying. They do what they feel is as good as can be done. At this maturity level the organisation is sensitive to outside signals that something is wrong and files those signals, but no action is taken to acquire additional knowledge. Up to a point staff is educated on methods for solving reported problems within the confinement of the office. 'Best professional knowledge', available handbooks, and sometimes colleagues and the internet are used for solving problems. Management is sensitive to benchmarking by highly influential and media connected research institutes. There are limited resources available for basic analysis and 'fire fighting' measures; in special cases there is some additional money for more structural interventions, provided the investment suits other objectives as well.

- **Calculative:** the stakeholder has systems in place to manage hazards, which are supported by the administrators and politicians: 'we have the solution'. However, the system is applied mechanically. Staff and management follow the procedures and instructions, but do not necessarily believe that those procedures and instructions are critically important to their jobs or the operation. Staff and management focus on *involving* stakeholders and try to get them to take their responsibility and help solving the problem. Staff and management take care that they are educated and informed on the current state of affairs and common methods for tackling problems that arise. A lot of audits are carried out. The organisation is sensitive to benchmarking of any kind. There are adequate resources available for interventions that are affordable and cost-effective in the short and medium terms. Long term efficiency is not taken into account. There is no systematic looking back: evaluation of interventions is only undertaken when there apparently was something wrong. Calculative organisations are hard to move because they are comfortable, even if they know that improvement is possible.
- **Proactive:** the organisation has systems in place, including procedures, resources, technical means and staff, to manage hazards, vigorously supported by administrators and politicians. In this stage attention is still focussed on problems and potential problems that are observed, where a problem is only a problem if the observer perceives it as a problem. Pedestrian quality targets and strategies are laid down in a dedicated policy plan. Staff and management have begun to acquire beliefs that pedestrian quality is genuinely worthwhile and are obsessed by obtaining data. They concentrate on *co-operation*, both within the organisation in integrated teams, including stakeholders from outside the organisation. Staff and management are well informed and educated on the issue and are motivated to gain insight in the functioning of the system and to look for options for improvement. There is no doubt about the potential benefits of pedestrian quality and they take initiatives to compare the organisations' effectiveness with sister organisations and other trend setters, both nationally and internationally. The aim is to learn and deal with the issue on a State-of-the-Art level. Outcome of current scientific research is applied. There are adequate resources available for a program of interventions that are cost-effective in the short, medium and long term. Policy robustness is a serious consideration and management and maintenance are fully integrated in the policy program. The policy program's results are monitored and evaluated on a regular basis. Communication with the outside world comes natural and is not restricted to successes.
- **Generative:** There is a chronic anxiousness regarding quality deficits. At this stage the aim is not so much to solve or prevent (perceived) problems, but to improve the quality of the pedestrian's environment so that he feels more at ease and can perform optimally, stimulating the pedestrian to bring prosperity to the community. Quality thinking is fully integrated into everything the organisation does. The value system associated with pedestrian quality is fully internalised as beliefs, almost to the point of invisibility. The organisations' activities are directed at continuous improvement of pedestrian quality. For

Hudson (2001) states: *'Cultural change is drastic and never takes place overnight. If a safety culture (read: pedestrian quality) champion leaves, there is often no-one to take up the fight and the crucial top-down impetus is lost. But even without a personal change there are two threats to successful transition to a higher level of safety culture (read: pedestrian quality). One is success, the other one failure. In the case of success, effective processes, tools and systems may be dropped, because the problem is perceived to have gone away. In the case of failure, old-fashioned approaches may be retrieved on the grounds that they worked before. But in both of these cases, the new, and often fragile, beliefs and practices may not have become sufficiently internalised to survive changes at the top.'*

In his presentation for the 4th PQN meeting Zaidel²⁶ concludes that the logical way of dealing with pedestrian mobility and safety would be to attend to preconditions first, secondly to take away latent accident causes and lastly focus on improving actual traffic behaviour. In fact pedestrian research actually evolved the other way around: in the first phase the pedestrians' traffic behaviour was studied, then underlying factors were identified and lately research attention seems to focus on preconditions. Thus the research tends to evolve towards an increasingly comprehensive and 'logical' approach.

In the course of time stakeholders have discovered ways to tackle concrete problems regarding walking, public health, liveability and sojourning in public space. Interested scientists, policy makers and practitioners have put effort into learning how to promote walking. In literature and some policy plans a general idea about what the ideal situation with regard to pedestrians would look like, is voiced. It becomes more and more clear however that we do not have adequate insight in the processes that lead to problems and processes that inhibit their solutions. The more general causal factors behind the undesirable events rarely get touched. Every once in a while unexpectedly new undesirable events 'pop up' and additional measures have to be taken. Policymakers will get the feeling that they are always behind the time²⁷. Decision makers find it difficult and unrewarding to react to an issue when they thought that they had already dealt with it. They feel they have other urgent matters to attend to.

A pro-active and quality oriented systems approach offers a more structural solution. Here the point of departure is insight in the functioning of the system and fair image of what is required for walking and sojourning in public space, based on insight in pedestrians' needs and abilities. In such an approach problems are dealt with implicitly, and in an integrated way. Although the approach focuses on benefits for the pedestrian, evidently the provision of favourable conditions for pedestrian can only be supported if they do not go against the interests of the providers.

From other fields²⁸ it is known that a systems approach can help to get better insight in relevant processes. A systems approach integrates knowledge regarding aspects of walking and sojourning in public space as well as relevant interrelations, processes and contexts. It offers a holistic view on walking and sojourning and on conditions that determine walking and sojourning in public space. The focus is on the interaction and interrelation between the different types of factors both inside a defined system and with the environment around it. A

²⁶ PQN working groups meeting in Valencia in October 2007.

²⁷ For example: the notions that there is as much multi-modal walking as there is mono modal walking and that the number of injury accidents without involvement of motor vehicles is neglected in road accident statistics, but nevertheless quite substantial.

²⁸ For example process industry, biology, medical sciences and road safety.



systems approach can therefore help to map determinants and influential factors comprehensively, making obvious that the total is more than the sum of parts.

However, like any approach, it has its drawbacks and limitations. The strategy is top-down based and as all models it is a simplification of reality. It implies loss of detail and items that are perceived 'not relevant' are excluded from the model. Examples are the maps that are used in navigation instruments. They are based on aerial photographs, which show individual buildings. In the maps these buildings are simplified to 'built-up area'. Thus orientation by means of building characteristics, like 'single houses', 'detached housing' is not possible. Other possible drawbacks can be that a priori assumptions are made with regard to the demarcation of the elements of the system and interrelations. With regard to pedestrians, for example, the common a priori assumption is that all pedestrians want to go somewhere. This is not valid. Some pedestrians simply want to sojourn (Mokhtarian & Salomon, 1999). Another risk is that the system is simplified to such an extent that validity is compromised. With regard to pedestrians, simplification of the system to man – vehicle – road is such an example. Pedestrians differ fundamentally from other road users. For instance, as a pedestrian people do not use a vehicle, but all use of a vehicle implies some walking, and not all relevant movements takes place on roads.

Complementary bottom-up approaches, like taking advantage of grass roots initiatives, public debate, gathering narratives and stories, and participation and public-private partnership, can help to overcome these limitations by providing insight in characteristics of the elements and their interrelations and support for interventions, that cannot be delivered via the systems approach alone.

Anyway, a science based systematic (generative) approach to pedestrian quality is expected to make a big difference to the citizen's quality of life as a pedestrian. Contrary to safety, however, the benefits of such a systematic approach, to pedestrian quality are not yet obvious to most stakeholders. They can have several reasons for not adopting a systems approach: they are not aware of its existence, the approach is not considered relevant for the issue or the approach is not adopted because of its perceived complexity. In this context the current PQN study can contribute by documenting and substantiating what a fully matured pedestrian quality policy approach looks like and by demonstrating its benefits, which in general are presumed to be²⁹:

- such an approach covers all options and prevents a one-sided approach and promotes synergy between the policy content, process and context;
- it offers best value for money;
- it improves the image of the pedestrian issue by taking a 'professional' rather than an intuitive approach that is often associated with 'minor' issues.

1.5 Steps towards a generative policy process

A policy development process is by definition a change process, which starts from awareness that the current situation is not good enough and needs to be changed for the better. There is however a fundamental difference between reactive and proactive or generative approaches. Whilst *reactive*, problem solving approaches focus on finding solutions for individual or combined problems that are identified at the start of the process ('we have a problem and we will try to solve it'), *generative* approaches take a wider, quality oriented perspective and start the change process with modelling the system to obtain a

²⁹ the arguments originate from an internal brainstorm session at DVS Centre for Transport and Navigation in October 2008.

comprehensive image of how it functions and then identification of deviations from the intended state. The general principle involved is called 'error-controlled regulation' (Ashby, 1956, Chapter 12, cited in McLoughlin, 1969). According to Ashby's ideas the system works like a thermostat, where a heat source is controlled by deviations from the prescribed temperature. It is actuated by a control device which is supplied with information about the actual state compared with the intended state. He states that there are four common features of all control (McLoughlin, 1969):

1. The system to be controlled
2. The intended state or states of the system
3. A device for measuring the actual state of the system and thus its deviation from the intended state
4. A means of supplying correcting influences to keep the system within the limits set.

In his book 'Urban and Regional Planning' McLoughlin (1969) discusses a systems approach, where the system he wishes to control is the city, the desired states are expressed in the plan, the actual state at any time is measured by all forms of survey, and the actual conditions are compared with those intended by the plan. He concludes that the evolution of the city can be influenced by the flow of additions, removals and alterations to land uses and communications. He identifies two ways for achieving changes: directly by carrying out changes and indirectly by regulating the flow of changes proposed by others through processes of development control. The latter implies the power to say 'yes' or 'no' to a very wide range of private and some public proposals. McLoughlin visualises the basic process in a simple model (see Figure 2).

Ashby's and McLoughlin's basic thinking can be translated to a model for a generative pedestrian quality policy process and thereupon steps can be defined to be substantiated in this Pedestrian Quality Needs study.

With regard to pedestrian quality, a generative change process can be initiated when there is a general target set for pedestrian quality, like 'we provide a system that is good for pedestrians'. In current policy papers in many European countries mobility, accessibility, safety, health and sustainability are seen as critical quality aspects of urban space and the transport system:

- *Mobility* is defined as the potential to move around (decide to make trips, actually travel and sojourn in public space).
- *Accessibility* relates to the degree to which a person can reach and enter a public space. It is strongly related to Universal Design or Design for All. This is about making things accessible to as many people as possible, regardless of age, ability or personal situation.
- *Safety* is defined as lack of threats to personal integrity and goods (injuries, fatalities, property damage) while travelling and sojourning in public space, irrespective of their cause (traffic, terror, violence, animals,...). This definition includes security.
- *Health* is both precondition (input) and 'product' of walking as a physical activity. Thus health can relate to the pedestrians' abilities and competences. A lack of health restricts walking options and thus mobility. On the other hand, by walking people can sustain or even improve their health, so that they can be more mobile.
- *Sustainability* refers to the absence of negative consequences for future generations from decisions taken at this moment.



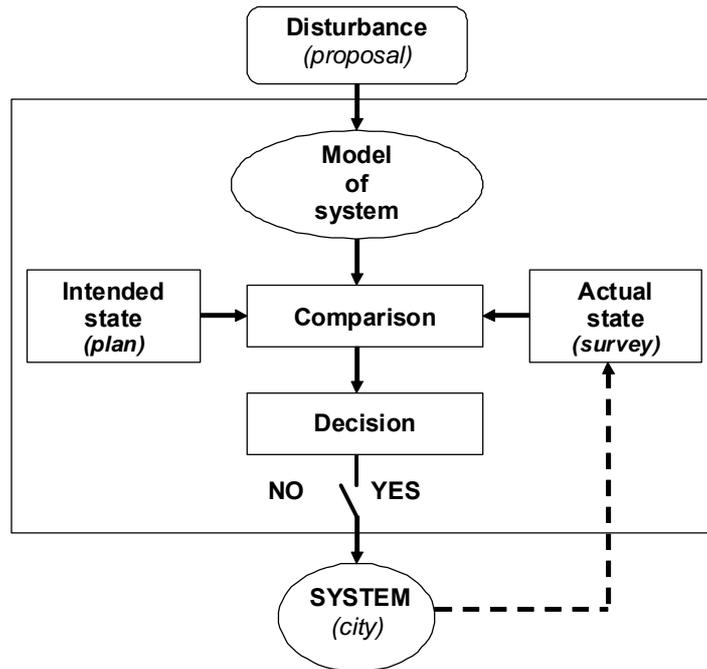


Figure 2 Error-controlled regulation (adapted from McLoughlin, 1969)

These quality aspects may be understood both on the micro level from the perspective of a single pedestrian, and on a macro level as qualities of the environment.

The first step in the policy process is to form an overall view of the factors that determine the qualities that the system as a whole offers to the pedestrian. As in the McLoughlin model thus the (ideal) process starts from a comprehensive model of the system. This presumes that such a model is available. This however is not very likely, since the actual knowledge on pedestrian quality needs is rather fragmented and imperfect due to limited attention to the issue (Methorst, 2003). If no such model is available, it needs to be developed first. Modelling the system includes identifying elements and the nature of relations between the elements as well as the identification of major categories of influences on the functioning of the system. The activities are to result in a conceptual framework, which gives overview and insight into relevant relations within the system.

The second step is to specify how the situation for the pedestrian should be: *the intended or optimal state* of the system for the pedestrian's performance. Such a specification is built on knowledge of the pedestrian's needs and abilities as well as the interests of other stakeholders. It sketches the general requirements of the pedestrian's environment and options to improve his or hers abilities to cope with public space characteristics, traffic, other people and the transportation system. Lastly the requirements are ranked for their relative importance for walking and sojourning in public space, as well as the degree to which they fit within the responsible stakeholders' interests. These answers are to be summarised in a statement on general end goals and targets or visions regarding pedestrian quality needs and wants. The analysis of the requirements and assessments of what preconditions are presumed necessary can be captured in an Audit Checklist. Of course, such work does not have to be completely repeated in future policy development processes.

The third step is to picture the actual situation that the pedestrian currently encounters, that is *assessment of the current features* and the opportunities (level of service) offered. This implies a survey on what facilities and opportunities, in the widest sense, there currently are. The items to be dealt with in such a survey follow from the list of identified requirements and

desirable opportunities. Analysis of the actual state and reconstructions of the history of developments can be laid down in a reference document on the current level of service.

The fourth step is to compare the *actual state* with the *intended state* and explain the deviations. Key questions here are to what extent are the identified pedestrian's and relevant stakeholders needs met, what deficits can be traced and what options are there to mitigate those deficits. Here compliance with the stated requirements, the degree to which general aims regarding mobility, accessibility, safety and health are met, and the pedestrian's and other stakeholders' satisfaction, will be decisive criteria. The gathered insight aims to lead to the identification of mechanisms with regard to compliance and satisfaction, to be recorded in a Targets and Cues for interventions document. In such a document attention can be given to insight in Best Practises.

In common policy development practise the second, third and fourth steps in the process can and will probably be combined to one Analysis step.

The fifth step is to prepare and decide on interventions. This step covers the identification of promising interventions, assessment of potential system output, formulation of recommendations for making it happen and lastly, the formulation of an action plan.

A key precept is that interventions will be most effective when they operate on multiple levels and that synergy between types of intervention and interests are adopted (Sallis et al, 2006). It is agreed that a combination of legislation, engineering, education, enforcement generally works better than each of them separately. Likewise, any operational intervention, like reconstruction of a road crossing, has to fit within the network structure, which in turn has to be functional for traffic flows that result from a given spatial distribution of origins and destinations. An important criterion in the decision must be to what extent all stakeholders benefit, relative to implications of the plans to their functioning and negotiation power base.

Products of this step can be a list of promising interventions, insight in preconditions for making it happen, including insight into gaps in knowledge to be researched, cues for tuning interventions within a (general) action plan and ultimately long term, medium term and short turn action plan plans.

There is no single decision maker who covers the whole pedestrian quality system. There are many stakeholders, policymakers and deciders, each responsible only for specific parts of the system. As in road safety, however, national government can assume general policy accountability for pedestrian quality (Department for Transport, 2007) and directorship towards other stakeholders, but at present there are hardly any national governments that claim this role (OECD/ITF, 2010).

Policy processes are cyclic. Once a decision is made and interventions are implemented, the situation for the pedestrian and stakeholders issue will change. It also may happen that the policy context changes, for example because of elections, economical or societal changes. This will influence the perspectives on the 'intended state' and possibly even the general goals. To cope with these changes it is wise to have some kind of monitoring system to reveal the direction of change and to make plans flexible.

In figure 3 this dedicated process model is visualized. The numbers in the figure relate to the basic steps to be taken in a generative walking and sojourning quality policy process.



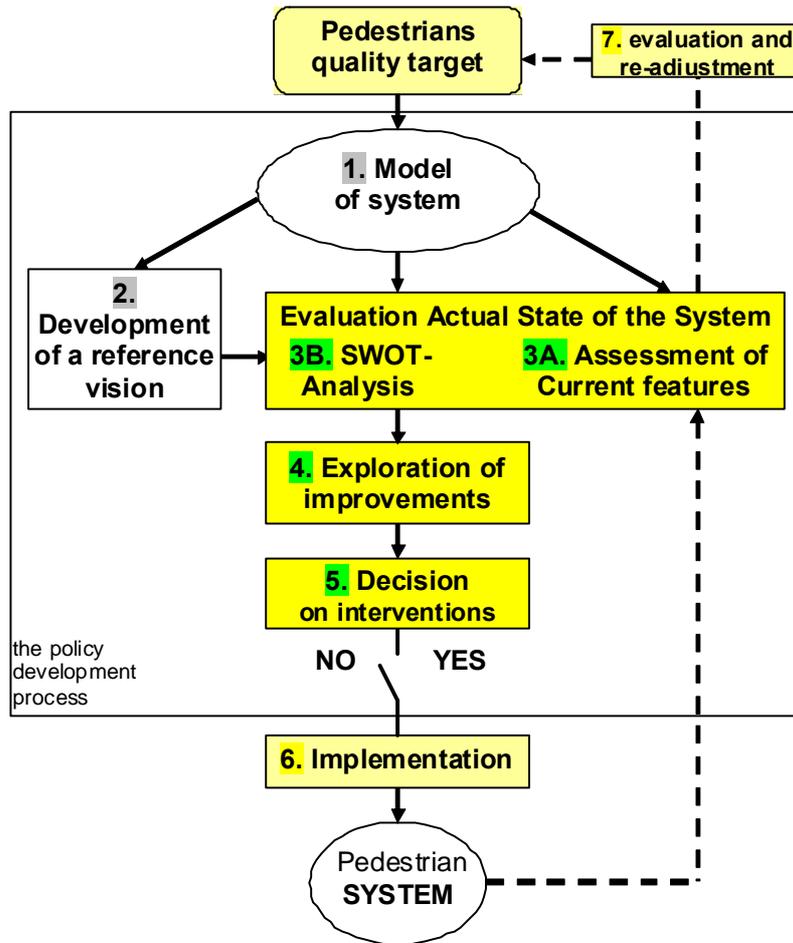


Figure 3 Steps in a generative pedestrian quality policy process (after McLoughlin, 1969)

In reality generative policy process steps are not so clearly defined. On the generative policy maturity level actions are taken continuously. They will not depend on a master plan or clearly defined policy processes. Often missing empirical evidence forces the developers to start on best guesses. During the process, because of advancing insight, the model can and will be perfected. It often happens that later on questions pop up that lead to answers that makes one discover that in an earlier stage relevant items were missed. Therefore an iterative process will be sensible practise.

Furthermore, it can happen that during the process new empirical evidence or insights from other fields sheds a different light on the issue. In this PQN study for example, insights, theories and models from adjacent fields like process industry, philosophy, health sciences, ecology etc. are 'lent' and reflected to help advance effectiveness.

Also, modelling and identification of general requirements do not have to be repeated in every new policy development process, so in some cases these steps can be jumped.

The steps in a generative pedestrian quality policy process discussed above structure the outline of the PQN Working Group 4 Coherence and Integration, which aimed to substantiate the policy development on the pedestrian issue.

Step 1 Conceptual framework

In this report the fundament for the development of a dedicated quality oriented pedestrian policy will be laid. The pedestrian quality system is built on theoretical and practical input from various disciplines. In chapter 2 of this report the pedestrian quality system will be defined and substantiated.

Step 2 Development of a reference vision

The second step is aimed to discuss work and results regarding the intended state of the system. This work includes substantiation in three sub-steps: the identification of needs in relation to the pedestrian's abilities, the identification of requirements with regard to the system's elements and relations that create opportunities to satisfy the needs and lastly the development of an integral and comprehensive image of the most desirable design and state of the system, the reference vision.

Step 3 Evaluation of the actual state of the system

In this step work is focused on the assessment of Strengths, Weaknesses, Opportunities and Threats (SWOT) of the current situation with regard to pedestrians. This assessment leads to a comprehensive image of the current state of affairs regarding pedestrian facilities and relations between stakeholders or social environment, the physical environment and transportation. The assessment is aimed to lead to insight in deficits and threats to be remedied, qualities to be kept and managed, and opportunities to be seized to prepare the pedestrian system for the future.

Step 4 Exploration of improvements

In this stage of the policy development process work is devoted to the development and valuation of measures. Sub-steps are the identification of critical combinations of factors leading to strengths, weaknesses, opportunities and threats to agreeable, comfortable and safe walking and sojourning in public space, as well as the identification of mechanisms therein, and the identification of potentially effective measures.

Step 5 Decision on interventions

When promising interventions with regard to quality for pedestrian are identified, it is necessary to subsequently deal with evaluation of the potential output of individual interventions and the formulation of recommendations or plans for making it happen will be substantiated. In this exercise external goals and targets are assessed to create win-win situations for walkers, sojourners *and* competing interests.

Step 6 The added value of a systems approach to pedestrian quality

In the context of the PQN project it is important to find out what the added value of a systems approach to the pedestrian issue is. The proof of the improvements, however, is 'in eating the pudding' and cannot be assessed effectively before interventions are actually implemented. In the PQN project theoretical and methodological aspects of the assessment of the added value of a systems approach compared to reactive approaches can be discussed. As the systems approach is not yet implemented, the real effects of implementation cannot be assessed.

1.6 Demarcation

This study aims at demonstrating the added value of a systems approach to pedestrian quality policy development and implementation, and is to result in a picture of what a generative approach looks like.

Conditions for pedestrians vary widely from country to country, region to region and even city to city. There are differences in climate, in spatial conditions, quantity and composition of traffic, legal position, culture regarding walking and presence in public space etc. These differences lead to different pedestrians' needs and make different demands on their competences and abilities. Tailored solutions for different countries, regions and cities are



needed. Within the scope of this report however such detail cannot be provided. The discussion will focus on principles and procedures that can help provide the needed level of detail when the stakeholder needs it.

In the above text already a number of limitations of the project came to light. For good order here the demarcation of the study is summarised below:

- the study focuses on pedestrian needs; it takes the pedestrian as starting point and assumes that the system needs to be adapted to the pedestrian and not vice versa³⁰;
- the study confines itself to 'everyday walking'. Long distance recreational walking, wandering and walking for sports are not included, but may of course profit from interventions taken to improve walkability. Thus time consuming discussions on niches regarding these issues are prevented. It is however assumed that this limitation will still cover the vast majority of pedestrians needs;
- The study is confined to walking in public space, where public space is all space that one can enter without needing special permission and where the police has jurisdiction;
- the study aims at comprehensive coverage of the issue. This means that the study focuses on overview and generic insights, and not on a detailed analysis of pedestrians needs, requirements, interventions and design aspects;
- the study relates to the D4A principle and particularly aims at assessing needs of those that have most trouble coping with the system;
- the study is confined to the European situation and recommendations will not necessarily cover the situation elsewhere; generic lessons learned elsewhere are taken into account, when relevant for the European situation;
- the study is explicitly not confined to the historical and current state of affairs, but extends to future prospects and durability aspects.

³⁰ Thus the environment needs to be adapted to the human competences and limitations. In some popular design concepts, like Shared Space, it is assumed that humans will adapt to their environment, provided it is designed in a certain way. The devisers argue that, given the circumstances, pedestrians benefit. It may be however that some fundamental needs are compromised (Piaget, 1968; Methorst et al, 2007).



2 Conceptual framework

'A proactive approach builds on scientific insight'

The first step in the advocated systems approach to pedestrian quality is to model the system. The aim is to build a conceptual framework that helps to find out what can be done to better support walking and sojourning in public space. The basic assumption is that the pedestrian is best served when his environment provides ample opportunities for the satisfaction of his needs for mobility, accessibility, safety and health. In other words: improvement has to start with insight in the pedestrian's needs and the factors and processes that influence those needs.

This chapter concerns the building of a conceptual framework, which supports these axioms and helps to structure the study and communication on the research aims and results. The conceptual framework is meant to be a set of tools to picture the issue comprehensively and to find out what factors play a role, how the factors interact and how the pedestrian can be served best. An important function of the conceptual framework is to generate relevant research questions, to provide clues for tackling the questions, to provide a check on comprehensiveness of the coverage of the research and recommendations, and a means for taking stock of gaps in knowledge, for recommendations on future research on the issue.

It is clear that such high demands cannot be met by a novel conceptual framework. It should therefore always be treated as 'work in progress', meaning that the actual model has to be adapted to advancing insight.

Models and theories to support policy development should be evidence based and retrieved from research as much as possible. The conceptual framework that is presented in this chapter is a very general model and is to a reasonable degree supported by evidence from research. It covers the general picture, but is not meant to be helpful in explaining and reasoning on lower aggregation levels, for example with regard to concrete road user behaviour or road safety mechanisms on the various decision and policy levels.

The story line of this chapter is as follows:

- The chapter starts with a more detailed discussion on framework requirement specifications.
- Next the basics of a systems theory are described. After that introduction, a general model for a pedestrian travel & sojourn system will be painted in section 2.2.
- Then, in section 2.3, policy options with regard to input, particularly clues for interventions, are presented.
- Interventions will have bearings on options that pedestrians have and decisions that they take; in section 2.4 consideration to the modelling of pedestrians' needs and decision processes will be given.
- In section 2.5 the preconditions for program development and intervention strategy principles will be considered
- The following section 2.6 concerns the assessment of the output of the system.
- Section 2.7 renders synthesis, in which the system will be placed in the light of different perspectives and the individual perspective taken in the pedestrian needs and decisions model will be translated to a collective perspective.
- The chapter is concluded by a description of a proposal for a functional process design.

For readability reasons, definitions of the concepts used in this report are not included in the text, but are dealt with separately in Appendix 1 - Glossary.

2.1 Framework requirement specification

In general the functions of a (theoretical) framework are: putting things into order, understanding or prediction, instrumentation and evaluation.

One of the greatest dangers of a comprehensive approach is that one gets lost in details. In this context it is vital that a well ordered overview is formed, in this case of the pedestrian travel and sojourn system, its inter-relations and its significance. With the help of a proper conceptual framework this overview can be generated.

In this project the second function of the conceptual framework is to provide a basis for a systematic assessment of the current state of affairs, needs for change and interventions, consequences of possible interventions, requirements for implementation and evaluation of results.

Because of the scope of the issue and the large number of stakeholders, this study is not a one-man-job. Within the circle of participating researchers, structured communication is needed. Communication about the issue, and about needs and options for change and what is needed to get appropriate insight and to produce significant results, is crucial for the success of the project. Furthermore, ultimately the probably complex study results will have to be communicated. Thus the third function of the conceptual framework is to be a reference for communication.

Consequently, a conceptual framework for this study must help:

- to structure thinking and provide an overview of the pedestrian travel & sojourn system³¹;
- to position and structure available knowledge, statements and insights;
- to evaluate the state of affairs with regard to system knowledge, check for completeness and define what data, information and knowledge needs to be gathered. The conceptual framework must help generate relevant research questions and organise the quest;
- to assess what (kind of) interventions can evolve or change the system into the desired direction. The framework must give context, cues for inciting solutions, i.e. specific activities, policy making and interventions;
- to assess the relevance of the outcome of the research and what (fundamental) gaps there are in knowledge.

For these functions the framework model needs to be:

- relevant (describe the whole system and its comprehensiveness on a highly aggregated level, fit the working practise of researchers and stakeholders and needs to apply to all authority levels (local, regional, national, European))
- valid
- reliable
- predictive
- flexible
- self-consistent.

³¹ In the PQN project the Conceptual Framework also helped to structure communication within and about the project.



It has to be noticed that a conceptual framework is a model, and that a model is a reduction of reality; it is suited to a limited scope of applications.

2.2 Towards a systems approach of Pedestrians' Quality Needs

The Systems approach in the PQN project is based on Systems Theory: the trans-disciplinary study of the abstract organization of phenomena, independent of their substance, type, or spatial or temporal scale of existence. It investigates both the principles common to all complex entities, and the (usually mathematical) models which can be used to describe them.³² Systems theory was originally proposed in the 1940's by the biologist Ludwig van Bertalanffy (General Systems Theory, 1968) and furthered by Ross Ashby (Introduction to Cybernetics, 1956).

A human being can be seen as a system. A system³³ gets input (i.e. food, ideas, external sensory stimuli), it processes that input (=throughput) and produces output (i.e. observable behaviour, waste materials, new ideas). Likewise a pedestrians' travel and sojourn system can be defined (see Figure 4). Here, inputs to the system are either interventions and autonomous changes of the environment, amongst others: energy (food), money, information, technology and building materials; examples of output are 'products' like economical value, a pedestrian friendly urban environment, practical rules, norms and values, connected neighbourhoods, a healthy population, a sustainable environment etc. In some cases the 'product', such as a pedestrian friendly environment, can function as input to the system.

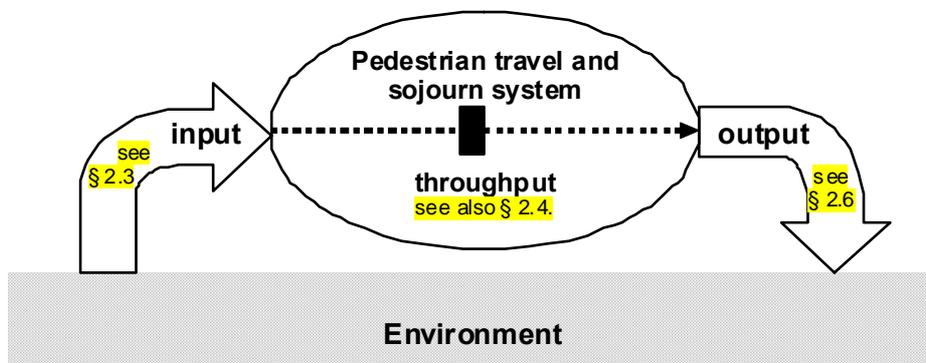


Figure 4 A pedestrian travel & sojourn system with its environment (after Heylighten, 1992)

The pedestrian system is part of a greater whole. The pedestrian system itself consists of interacting elements or subsystems and interrelations between them (see Figure 5). Via interventions or autonomous changes the pedestrian system receives inputs from its environment, i.e. money for infrastructural changes, information on behavioural rules, a good press for being environmental sustainable, punishment for not abiding the rules, technology and building materials.

³² Citation of a webtext written by F Heylighten and C Joslyn, titled "What is system theory", <http://pespmc1.vub.ac.be/SYSTHEOR.html>

³³ With regard to human beings each specific discipline like biology or behavioural psychology has its own perspectives on man as a system. For example: in biology input is food, temperature, sun, air. Growth is seen as throughput and behavioural repertoire is output. In behaviourism external sensory stimuli are input, the brain is a black box and observable behaviour is output.

When a pedestrian walks in public space, he or she functions within the transport system, which can be seen as part of a greater spatial system and as part of a social, normative and cultural system. The pedestrian system also produces output, such as economical value, a pedestrian friendly urban environment, practical rules, norms and values, connected neighbourhoods, a healthy population, a sustainable environment etc. In some cases the 'product', such as a pedestrian friendly environment, can also function as input to the system.

When someone on foot encounters other walkers or moving vehicles, he is in traffic. Traffic is a typical phenomenon of the transport system. *People* travel from A to B. If they do not do this on foot, they use a *vehicle*³⁴ for it. With that vehicle, they mostly travel on roads. These roads in turn are part of the physical *environment*. The road network and the (immediate) environment are usually referred to with the concept *road infrastructure*. Traditionally the transport system is seen as a system in which the elements 'road user', 'road' and 'vehicle' interact with each other. From transport, traffic and road safety analysis it appears that it would be more appropriate not to speak of 'road' but of the 'physical environment' or 'spatial environment', since the surroundings of the road are a factor in road user behaviour as well. From the pedestrians' perspective, not only movement (travelling) but also sojourning in public space should be regarded.

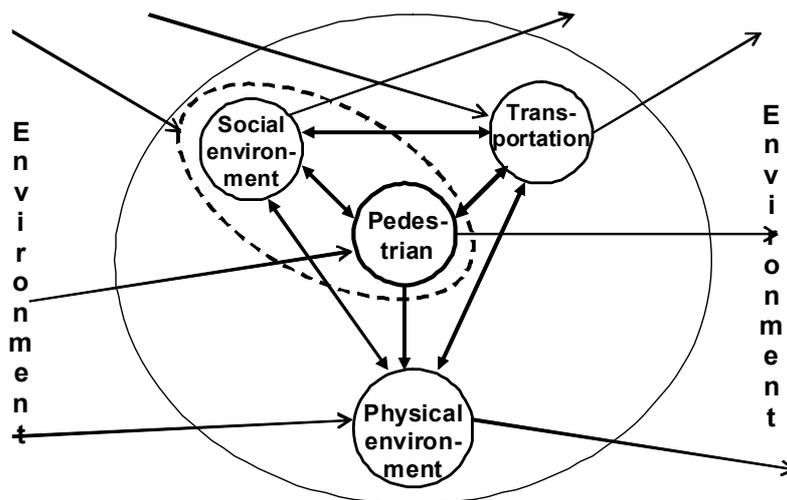


Figure 5 A pedestrian travel & sojourn system containing a collection of interacting subsystems

Furthermore, one's behaviour is also affected by one's social environment. People affect each other, both on the individual, group or societal levels. Also, when several pedestrians and vehicles make use of the road network, there are rules to ensure that this proceeds smoothly and safely. This means that traffic is *organised*. Within the transport and traffic safety communities this conceptualisation is now universally shared.

The system from a pedestrian's perspective is made up of four groups of interacting elements or subsystems. In Figure 5 the elements or subsystems are represented by small circles. Interactions are visualised as bi-directional arrows; external influences are represented as one-directional arrows (inputs or outputs). The system is demarcated by an large closed line ellipse.

³⁴ There may also be (some) unmanned vehicles, like 'people movers' or remote control vehicles.

The elements in the system are:

- **Pedestrians**

A pedestrian is a human being assuming a specific role in traffic and in public space by walking and sojourning, in principle without using transportation means. This role defines the *personae* pedestrian. The same person can assume other traffic roles like using public transport, driving a car or riding a bicycle, thus becoming another *personae*.

In general pedestrians are expected to be able to use the road and public space. Authorities (policy makers, decision takers and providers of facilities) assume that pedestrians have the physical and mental condition and (basic) knowledge needed for that role, including insight, skills and attitudes and one must be properly equipped to cope with environmental circumstances. In some cases these demands however are or cannot be met.

Pedestrians can be grouped on characteristics like personal and lifestyle features. Personal features are for example gender, age, job, education, position, income, physical and mental abilities etc. Lifestyle characteristics are choice of place of residence, type of household, personal values, attitudes, housing and recreational preferences, consumption patterns, travel habits etc.

- **Social environment (\approx other humans in the environment)**

The social environment has many different manifestations: as individual or groups of 'others' that interact physically or socially, as a more abstract normative environment that imposes rules, norms and cultural values that the pedestrian has to deal with.

Other road and public space users affect the pedestrians' behavioural options and safety. Just like pedestrians they are assumed to have the physical and mental condition, knowledge, insight, skills and attitudes that such a role demands, which may or may not be justified.

On a more general level the social environment has normative dimension and a socio-demographic dimension. It imposes values and norms on pedestrians and affects their freedom of movement³⁵. These norms and values exist because traffic and society needs to be organised on various levels (individual, local, regional, national, international). There is a difference between (1) the official rules, like the traffic rules and regulations and the monitoring of compliance with these (enforcement) and (2) norms understood as the implicit code about how one should behave in traffic and public space, or how it should be arranged and organised. In the latter case, this reflects the culture, norms and values that exist within society.

- **Transportation system (\approx a variety of vehicles)**

The transportation system consists of moving vehicles and trains of vehicles that flow on roads or railways, of parked vehicles and of accessible units that pedestrians can use for transport towards other destinations. Traffic flow can be impersonal in that there is no interaction between the drivers and the pedestrians. Like parked vehicles they then are just objects that limit freedom of movement of pedestrians or even threaten their safety.

Pedestrians can either choose to walk an entire trip or make use of transportation means. Accessible vehicles, like the cars and bicycle that one owns, public transport units, elevators, however provide opportunities to travel elsewhere.

The vehicles are assumed to be able to move and be steered or operated, that is to say, move in all horizontal directions and slow down and speed up. The passenger vehicles are also assumed to offer protection to the occupants. Vehicles, regardless of their function, must not hinder or endanger pedestrians. Problems arise when this all is not the case.

³⁵ Burka rules can affect perceived security feelings and thus freedom of movement; air quality rules for cars on the other side do not affect most pedestrians' freedom of movement.

- **Physical environment (≈ public space)**

The physical environment includes the spatial structure, stationary elements in it and atmospheric conditions (weather). Some of it is natural, like woods, lakes but within the urban area most of it is man-made. The spatial structure includes the geographical location of various activities, social institutions, work places etc as well as transportation and walking and sojourning facilities.

For the use by pedestrians the natural structure, roads and paths must be formed or built in such a way, and the road environment must be laid out in such a way, that pedestrians can reach their destination smoothly and safely³⁶ and that they can sojourn comfortably and pleasantly in public space when they need or want to.

Atmospheric and climatic conditions, like temperature, sun, precipitation, moisture and wind influence the state and utility of the physical environment and 'behaviour' of the social environment and the transportation system.

In Figure 5 the pedestrian is intentionally put in the centre. This study aims at improving the situation and the position of the pedestrian. Existing inherent characteristics of pedestrians, like their physical and mental condition, knowledge, insight, skills and attitudes, are taken as a starting point; improving these are not primary targets, it is however clear that this may also improve the pedestrians quality of life.

Around the pedestrian and the social environment a broken line ellipse is drawn. This ellipse stands for the Human Factor. It expresses that the same individual can be a pedestrian at one time and assume another role at other times, becoming part of the pedestrians' social environment. Most experts (i.e. Hendriks et al 1998, Fegan, 2008) agree that most people do not identify themselves as pedestrian when they are not actually walking. This is a critical fact when dealing with changing the system. Humans can have different scopes and interests in the system. Richard et al (1996) concluded that scopes that people can have on their environment are nested. In Figure 6 such a nesting regarding the pedestrian issue is visualised. With regard to walking one can look at it from several cohesion levels:

- o **Personae pedestrian**, where only one's own walking and sojourning interests count
- o Individual person, capable of assuming other roles and taking them into account, but not necessarily the interests of other persons
- o **Interpersonal**, taking into account the interests and perspectives of the two or more individuals interacting in public space
- o **Organisation**, taking into account what the interest and perspectives of one's own group, organisation, company, institute.
- o **Community**, taking into account the interests and perspectives of the community one takes part in. Communities connect people and groups of people with a common interest. There are for example professional communities, territorial communities, internet users etc.
- o **Society** or national level, where the binding factor is citizenship of a nation or groups of nations.
- o **Planet**, where the common interest is the survival of the species, all species of even the existence of the planet.

As stated in section 1.6 Demarcation, the planet level scope will not be discussed in this study. The study will focus on the community and society scope levels. Knowledge regarding the organisation, interpersonal and personae pedestrian scope levels will be taken as input for policy development.

³⁶ Of course this does not exclude dedicated facilities: cars are not allowed in pedestrian areas and streets, pedestrians are not allowed on motorways and both are not allowed on rail tracks.



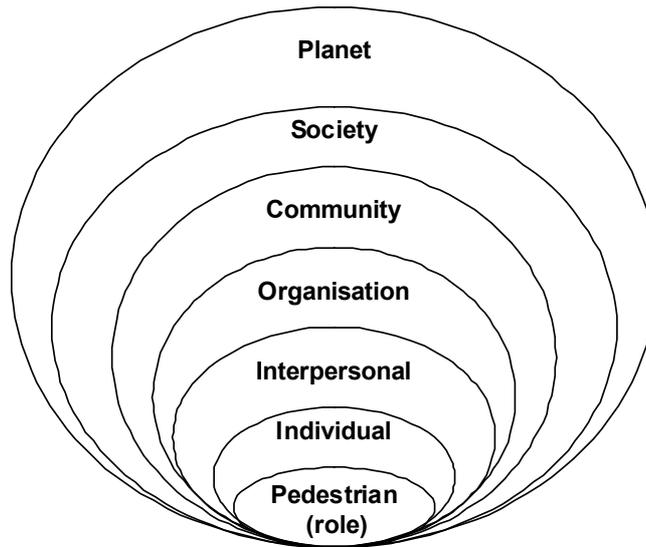


Figure 6 The scopes regarding system output to the environment (After Richard e.a., 1996)

Stakeholders

Different individuals, interacting public space users and organisations have different perspectives and interests or stakes in the functioning of the system on the community and higher scope levels. With respect to their role in the functioning of the system on the community and higher levels, in principle three kinds of stakeholders (Methorst, 2000) can be distinguished within the community arena: users, guiders and providers. Users are pedestrians and other users of public space. Guiders are the stakeholders that have the responsibility to guide the process that may or may not lead to changes in the systems, such as policy makers, politicians and decision makers. Providers are the organisations or sections within organisations that provide facilities, that implement the guiders' plans and that take care of management and maintenance of the system. The three kinds of stakeholders communicate and thus try to influence each others activities to suit their needs (see figure 7).

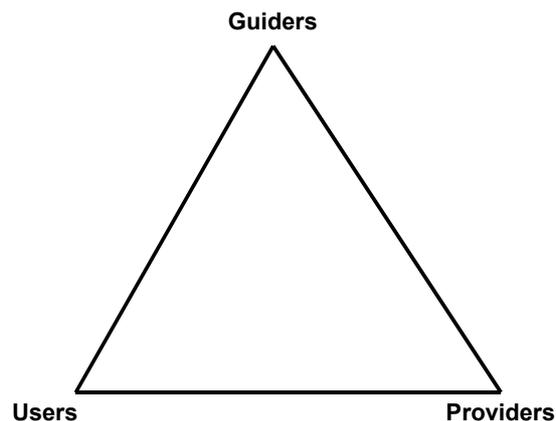


Figure 7 Stakeholders and their relations

With regard to pedestrian needs and wants, stakeholder interests and responsibilities are to a large extent determined by organisation characteristics, like position, power, leadership, scope of activities, mutual agreement on task division etc. Thus in many countries National government will not interfere with what they see as local matters and confine their policy to generic measures like legislation, funding of pilot projects, research programming and

facilitating dissemination of knowledge. Local authorities on the other hand are responsible for integration of interests in spatial plans on the executive level, and have to consider the interests of other road and space users, too. On the other hand, they will not be able to influence road user competences, hardware characteristics of transportation, behavioural rules, norms and values, and public transport connectivity on the regional or national scale.

As it is counter-productive to pass on irrelevant information to stakeholders, the measure to which specific needs and wants are relevant to a stakeholder must be assessed. In this regard it is necessary to profile stakeholders with regard to interests, formal and felt responsibilities and competences. Identified pedestrians needs and wants can then be matched to those profiles and communicated.

Preview of next paragraphs

In the above text, a basic description was given of the main elements, relations and functions of a pedestrian travel & sojourn system. In the following paragraphs first fundamental policy options with regard to **input** will be identified in section 2.3 *Clues for interventions*³⁷. Next a model of how the pedestrian system (in a restricted sense) works and how the internal elements interact on an individual level, will be introduced and defined in section 2.4 *Modelling the pedestrians' needs and decision processes*. In section 2.5 *Intervention program development* preconditions and major intervention strategy principles will be considered. In section 2.6 *Pedestrian system output*, the output of the system will be discussed in general terms. Next follows a paragraph 2.7 *Perspectives on the system*, describing the perspectives to be taken up in a comprehensive policy development approach. The chapter will be concluded by a synthesis paragraph focussing on policy development consequences. Here the translation from the individual perspective taken in 2.4 on the pedestrian decision process model to policy development tasks is painted.

2.3 Clues for interventions

Although the above pedestrians travel & sojourn systems model can help detect and describe fundamental relationships, in practice such a model is not very useful for surveying options for change and potential interventions and determining what 'inputs' to the system should be recommended. A practical tool for this is found in the Pizza model (Methorst, 2003)³⁸.

A common problem in policy making is that one tends to confine one's search for solutions to one's field of expertise. Thus most engineers focus on technical solutions within their field of expertise only and often do not include other engineering fields, education or enforcement solutions that alone or together could provide a much more effective solution to the problem. Likewise policy makers, particularly on the local level, concentrate on short term options and often fail to look at the larger context, long term trends and the need for more fundamental changes.

As a tool for open minded policy development, covering options for interventions more fully, the Pizza model was developed. Its aim was to form a source of inspiration for devising *comprehensive* transport and road safety interventions. Basically it is a picture-checklist. It is

³⁷ As stated before input includes both autonomous changes of the environment and interventions by stakeholders. In the context of this study autonomous changes are treated as a given state of affairs or development, to be included in policy development practise.

³⁸ The Pizza-model was introduced in 2000 in the road safety section of the Dutch handbook on transport and traffic sciences (Methorst, 2000). The model was published in English in the Vulnerable Road Users report (Methorst, 2003).



meant to help the policymaker to check whether all options are included in the desired comprehensive approach. It is assumed that the Pizza model, tuned to the above model of a pedestrian travel & sojourn system, also applies to determining options for interventions regarding the satisfaction of pedestrians' needs.

At a general level the Pizza model (see figure 8) shows that interventions can be directed at the various components: interventions can be directed at the mobile part of the transport system (**internal**) and the stationary (**external**) part. Another perspective is that interventions can be directed to **human** factors or to 'things' (**technology**).

More target oriented, interventions can be conducted on a number of levels:

- **Macro level:** provides the structural preconditions for the interaction on the strategic level; in the model this is pictured as the outer ring or outside area.
- **Meso (group) level:** provides conditions and an integration context for the interaction of the individual elements; in the model this is represented as the first ring around the core.
- **Elementary level:** the quality of the interaction on the operational level depends on the characteristics of individual road users (pedestrians and others), individual vehicles and the immediate surroundings (place); in the Pizza model this is the core of the figure.

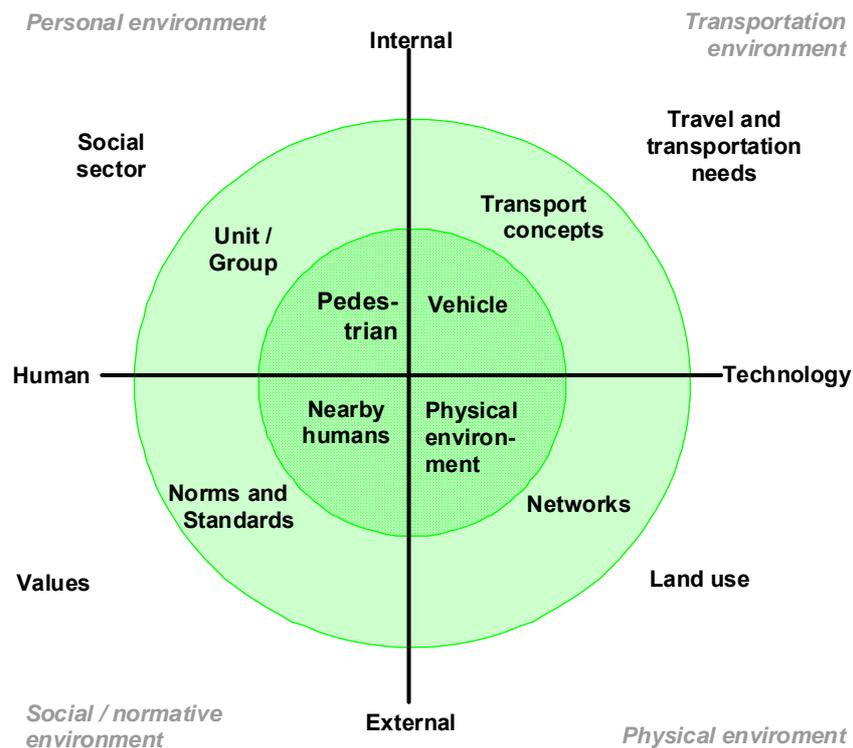


Figure 8 Pizza model for identification of potential targets for interventions (Methorst, 2003)

Traditionally road safety and vulnerable road users policies mainly aimed at the core of the pizza, or the concrete measures that can be realised in the relatively short term and that produce relatively fast results. The middle level concerns mainly measures that are more far-reaching, take substantially more preparation, in the order of magnitude of 3 to 5 years, and usually do not result in demonstrable effects in the short term. In the outermost layer,

processes take place gradually but very slowly. It can sometimes take thirty years for a change to have noticeable effects on the functioning of the system, its elements and/or its inter-relations.

Macro level interventions

At the Macro level the pizza slice of the *pedestrian* relates to the social preconditions that allow the groups to do something about their own mobility and safety. This might be, for instance, the financial and general material support given to improve physical health, to stimulate children to play outside, the opportunities for schools to attract pupils within a district, the priority given by the police to the enforcement of traffic violations when, in particular, vulnerable groups are disadvantaged. Another example: if profit margins of companies are low, and these companies have to compete on price, then the attention for safety may decline in companies offering passenger transport.

Particularly important are also fundamental research, knowledge management, creating a health and safety culture, general management measures like setting targets, establishment of (government) agencies for implementing strategies, facilitating achievement of expected performance, establishment of a 'watchdog' organisation (OECD, 2008).

For the pizza slice of the *vehicle*, the outer area is 'Travel and transportation needs'. Policy making at this level focuses on accessibility and level of service of collective transport, influencing the number of trips (preferably fewer) and the choice of mode of travel (preferably the safest and least polluting) and the volume of the mobility need. In general fewer vehicles on the road results in less hinder and endangerment of pedestrians.³⁹

The outermost part of the pizza quadrant *physical environment* is characterised by Land Use, but the physical environment also includes climatic and atmospheric conditions.

With regard to the *physical environment*, on this level concern Land Use policy interventions that touch the location choice, particularly regarding residential areas, essential services and sites with high visitor rates, aimed at minimizing conflicting traffic flows between motorised traffic and non motorised traffic, such as a main road between a residential area and a concentration of schools or medical services. Thus it is attractive to encourage elderly people to live in the proximity of the facilities that they frequently use.

Although in the end every individual's and organisation's behaviour contributes to climatic and atmospheric conditions, they are not really within the direct span of control of local, regional or even national governments, but relate to a worldwide policy level. Indirectly, however, by acting on personal and organisational values, influence can be exercised.

The word '*values*' refers to the importance attached by society to mobility of pedestrians, general road safety in traffic and passenger transport, security⁴⁰, public safety and health. For example, how does the importance of health relate to issues such as profitability of companies, or how traffic and transport relates to health, climatic change, how social issues like ageing of society are dealt with and how to bring about a health and safety culture in organisations. This heading also covers how high pedestrian needs stand on the political agenda.

Meso (group) level interventions

In the Pizza model the meso (group) level is formed by the layer around the core of operational interventions. This class of interventions concerns mainly the preparation and organisation of concrete interventions to be implemented on the operational level and setting the stage for influencing operational behaviour of the pedestrian and other users of public space.

³⁹ However, in special circumstances the actual influence may be different. For example, when a road is used up to capacity, this can result in a homogenous flow at low speeds, which can be less dangerous than traffic consisting of a limited number of vehicles travelling at very different speeds.

⁴⁰ for example: 'every woman has the right to be in public space without fear of physical or verbal violence'.



With regard to the **pedestrians** themselves, the company (e.g. a bus company) for which one works, or the school, the family, the association for elderly people can exert influence. The policy in this case does not focus directly on the pedestrian or other road users, but on the intermediaries for the target groups. Often this will not relate so much to regulations, but stimuli from the government side intended to prompt the group concerned to do something about promoting the satisfaction of pedestrians' needs by itself.

Policy at the meso level with respect to **vehicles** focuses on transport concepts: bicycles, mopeds, cars, vehicles for the disabled, light rail, vans, trains, passenger ships etc. This policy often touches the vehicle industry, dealers and transport organisations. The aim of the policy is to give the accessibility and mobility and safety of pedestrians a prominent place in the development of all kinds of vehicles. Here legislation and regulations are relevant options, but it is also possible to satisfy actual pedestrians' needs by intervening in the vehicle market, vehicle industry and transportation providers.

With regard to the **physical environment** at the meso level, policy is to be directed at 'networks'. On the operational level, the question is *how* infrastructure should be constructed from the standpoint of pedestrian mobility and safety. At meso level however the central question is *where* (e.g. in new construction districts, around schools, near industry parks etc.) from the standpoint of pedestrian mobility, safety and sojourn needs, roads, crossing facilities, paths, resting and sojourn facilities can best be planned. The key question here is often how, by offering attractive routes, one can prevent conflicts with other road users, especially conflicts between vulnerable groups and motorised traffic.

In the quadrant of **social environment**, meso level interventions concern norms and standards, which can be seen as the preparation or context for interventions on the operational level, where the concern is the interaction between road users. This interaction is determined by compliance with traffic regulations and more general rules of conduct that people use in traffic. The desire to behave in a pedestrian friendly and safe manner in traffic, is largely determined by the individual's standards (norms). At the meso level, the concern is to bring about security on the road and in public space behaviour, in which taking account of pedestrians, particularly children, the elderly and the handicapped, is an important factor. Education and publicity campaigns play a major role here.

Elementary level interventions

At the elementary interaction level, the central elements are individual road users, particularly **pedestrians**, drivers of vehicles and parked vehicles that might hinder or endanger pedestrians, the physical environment and state of accessibility, safety and repair of individual vehicles, particularly public transport vehicles.

Interventions of this sort are mostly connected to the general public and politicians' ideas of what should be done. It concerns concrete interventions of which the effects can be observed and measured relatively easy. To most people these are the kind of measures that really count.

With regard to the pedestrian himself examples of interventions are: traffic education, e.g. teaching safe crossing routines to children, revalidation programs, crossing instructions, law enforcement, physiotherapy and sport to improve physical abilities.

In the **social environment** quadrant, examples of operational level measures are security surveillance, enforcement of parking rules (i.e. no parking in the pedestrian domain) and dog dirt management.

As regards the **vehicle**, examples of measures on the operational level are enforcement of vehicle and transportation rules, promotion of provisions for the safety of pedestrians and first aid kits.

In the case of the **physical environment** concrete options are urban renewal, pedestrianisation, pavement maintenance, providing pedestrian crossing facilities, route guidance visually impaired, lowered curbs for the use of wheelchairs etc.

2.4 Modelling the pedestrian quality determinants

Ultimately the current study should lead to a better picture of what kind of interventions are needed to improve the pedestrians' functioning in public space and hence the added value of the output of the 'pedestrian travel & sojourn system'. In this context it is important that the main determinants of pedestrian behaviour and pedestrian quality are explored and modelled.

In 'Principles of environmental sciences' (Boersema, 2009) Steg & Vlek provide a useful structuring model for internal and external determinants of consumer environmental behaviour: the NOA Model⁴¹. In their role of pedestrian, pedestrians 'consume' their environment to fulfil their needs. Steg & Vlek explain that needs are not the sole quality determinants:

"... consumer environmental behaviour can be regarded as being governed by Needs (N), Opportunities (O) and Abilities (A) at hand for undertaking a particular resource-consuming activity. Needs and opportunities interact to shape people's Motivation to perform (MP) an activity: if there is a need as well as an opportunity, you want to consume. Opportunities and Abilities together determine Behavioural Control (BC): if there is an opportunity which you feel able to use, you could consume. And Needs and Abilities together underlie a subject's Opportunity Search (OS): if there is a need and you are capable of fulfilling it, you seek an opportunity to consume.

*Hence, changing consumer behaviour would involve changing people's needs, their (physical, technical or social) opportunities and/or their ability or capacity (physically, mentally or financially) to engage in the relevant behaviour. This means that environmental policy making may be oriented towards the 'inside' worlds of needs and abilities, the outside world of opportunities and the mixed worlds of motivation arousal (e.g. through marketing), enhancement of behavioural control (e.g., through education) and opportunity seeking (e.g., through finding feasible ways to fulfil needs)."*⁴²

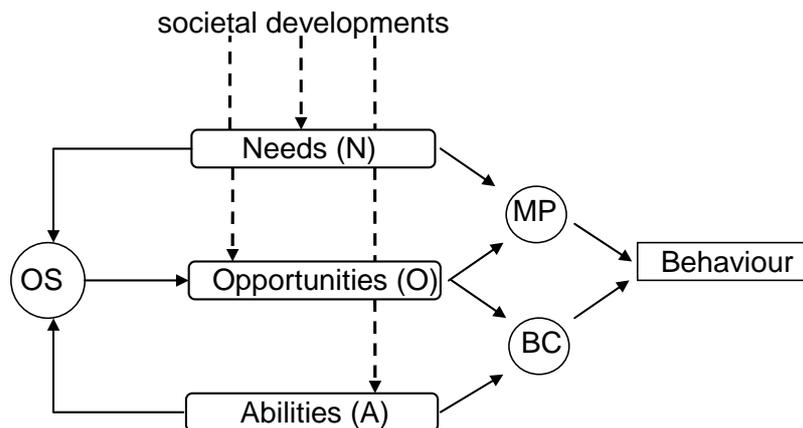


Figure 9 NOA Model for consumer environmental behaviour (adapted from Steg & Vlek, 2009)

The NOA model takes an analytical and rational perspective on the push and pull factors regarding consumer behaviour. The subjects themselves as well as 'common' policymakers

⁴¹ Steg & Vlek wrote a chapter on Social Science and Environmental Behaviour, where they give an excellent overview of achievements of behavioural sciences with regard to environmental issues and research and policy making.

⁴² Quote from Steg & Vlek's text of Chapter 9, section 9.7.2. Boersema, 2008

normally take a more intuitive perspective, focussing on concrete requirements and interventions. For example: citizens ask for zebra crossings, but essentially they want a comfortable and safe crossing, whatever form it may take. The analytical perspective takes a wider view and may include other options as well. If needs are expressed in functional terms, they will cover more options than a more specified requirement list will cover.

The model applies to several levels of behaviour. With regard to needs, decisions and acts, John Michon (1979) introduced the idea that road users make decisions on three levels: *strategic* (where to go), *tactical* (how to do it) and *operational* decisions (the actual walking and driving activities: 'automatic' reactions to traffic, steering, accelerating, braking). A more recent classification is the GDE⁴³ Matrix (Hatakka, 1999), which offers the same message, but on four levels: 'goals for life', 'Goals and context of driving', 'Mastering traffic situations' and 'Vehicle manoeuvring'. Combined and specifically attuned to the Pizza model and community level scope, in this study the following 4 levels of behaviour will be distinguished:

- the **lifestyle** level, where decisions are taken on a limited number of occasions in a person's life, like where to live, where to work, what kind of job one takes, marriage, getting children, retire from work etc. This relates to goals for life and skills for living. Existential decisions relate to '**being**' and identity.
- the **strategic** level, where decisions one takes before one gets into traffic, like travel choice (motive), where to (destination) and which mode will be used. Strategic decisions relate to '**going**'.
- the **tactical** level, where decisions one takes in traffic with regard to the route to be taken, where to cross, walking or driving speed and so on. Tactical decisions relate to '**travelling**'.
- **operational** behaviour: reactions to other road users, the traffic situation and other interacting persons and animals. With regard to pedestrians, operational decisions relate to '**walking**'.

Obviously on each behavioural level there are specific needs, opportunities and abilities to be taken into account. Thus for example on the existential level, an individual needs to have essential services like a grocery within one's action radius, the shop has to have practical opening hours and the individual has to know what the opening hours are. On the operational level a pedestrian needs adequate crossing facilities, a sufficient gap in the traffic flow and the ability to cross before the gap closes.

With regards to this study's aims, the performances of the other subsystems (social environment, physical environment and transportation) are only relevant for pedestrian quality in so far as they affect the pedestrians' behavioural options and decisions. In literature no readily available model or conceptual framework was found that describes the pedestrian quality relations systematically and comprehensively⁴⁴ and fits the project's need to deduct relevant detailed research questions, give place to research findings and insights and also can be used as a simple check on coverage of the issue and gaps in knowledge. Therefore a new conceptual framework was developed. The NOA model was taken as a starting point and extended into a more comprehensive notion (see Figure 10). In the following text the basic elements of the notion (needs and wants, abilities, opportunities, behaviour, pedestrian quality) are exemplified.

⁴³ Goals for Driver Education

⁴⁴ Theories like the Theory of Planned Behaviour, the NOA (Needs-Opportunities-Abilities) model, describe or explain the decision process, but as far as we could see none of them connects to (pedestrian) quality.

Table 2 Activity levels

Levels of behaviour	Type of decisions	Behavioural goal
Lifestyle	Fundamental decisions. Relates to goals for life and skills for living.	'Being' and identity
Strategic	Decisions relating travel or purpose (motive), where to go (destination) and which mode will be used.	'Going'.
Tactical	Decisions with regard to the route to be taken, places to cross, walking or driving speed and so on.	'Traveling'.
Operational	Operational decisions or reactions relating other road users, the traffic situation and other interacting persons and obstacles.	'walking'.

In this model 'Needs and wants' define the tasks that the pedestrian will try to perform. The pedestrians' Abilities define how good the pedestrian is in performing the tasks, whilst Opportunities define Go or No-Go. Opportunities and Abilities together define task difficulty and thereby the risk of failure and accidents. Successful performance, as well as the opportunities for successful performance define Pedestrian quality (= quality of the system).

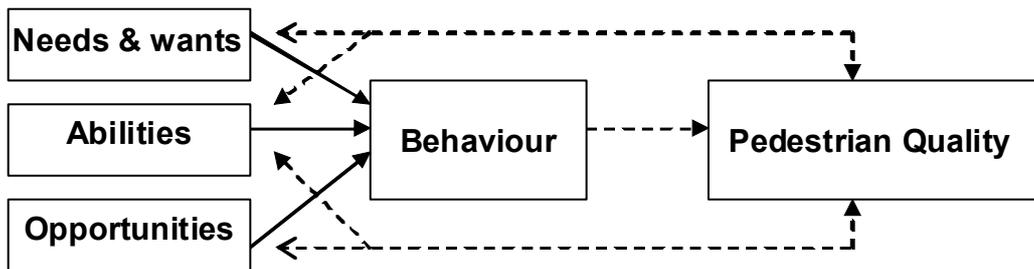


Figure 10 Pedestrian quality determinants

Needs, wants and motives

A need refers to something that is necessary for humans to live a healthy life. Needs are distinguished from wants because a deficiency would cause a clear negative outcome, such as dysfunction or death. Needs can be objective and physical, such as water and food, or they can be subjective and psychological, such as the need for self-esteem (Wikipedia). Thus a need is something that is necessary for survival (such as food and shelter), whereas a want is simply something that a person would like to have. Some economists have rejected this distinction and maintain that all of these are simply wants, with varying levels of importance. By this viewpoint, wants and needs can be understood as examples of the overall concept of demand (Risser & Chaloupka, 2009). *Quality needs*⁴⁵ and wants are by nature subjective, context sensitive and relative (Beukenkamp, 2001).

⁴⁵ A *quality need* refers to a desired quality of the pedestrian's environment, and is a synonym for person or group related *requirements*.



In economics, a *want* is something that is desired. It is said that people have unlimited wants, but limited resources. Each person has wants. You might want a laptop while your best friend may want a desktop computer. Thus, people cannot have everything they want and must look for the best alternatives that they can afford (Risser & Chaloupka, 2009). *Wants* refer to qualities of the system, services or objects that are 'nice' to have and are felt to be less necessary than *needs*, which are 'need to have'.

A *need* relates to a desired state of the system. It does not matter how that desired state is achieved. A *need* exists irrespective of satisfaction of the need.

So, needs tend to refer to a higher level of service than is currently realised. It is to be expected that particularly the elderly of the future will not be content with the current level of service (Methorst, 2005). A need may also concern difficulties that people experience to react adequately to a problem or to interrelated problems and the responses available. In many cases an expressed need can be seen as a claim for service (Bradshaw, 1994).

The concepts of *motives* and *needs* are strongly related. Motives or motivation can be seen as consciously felt, expressible or articulated needs. In survey research respondents are asked for their motives for certain behaviours in order to discover what the needs behind them are. At the strategic activity level motives are (implicitly or explicitly) used to decide whether or not to go somewhere and how to do that. At the tactical and operational levels the needs are generally not so clearly voiced, because much of this behaviour is skill-based 'automatic' behaviour; skills are built on experiences with satisfying one's needs, irrespective of one's ability to voice such a need (cf. Rasmussen, 1983 and Reason, 1990). Thus needs are taken as the more basic desires behind motives. Risser & Chaloupka (2009) describe the difference as: a motive is a tendency towards fulfilling or satisfying certain needs or to prevent unwanted consequences as reflections of non-fulfillment or non satisfaction of needs.

In practice most needs and wants are expressed in terms of familiar forms or measures, and not in terms of function: walkers say they want a zebra or traffic lights; the underlying need is the need to be able to cross the street safely. Needs and wants must be 'translated' to *requirements*⁴⁶, which is a documented characteristic of what a particular product or service should be or do.

*Quality needs*⁴⁷ vary for individuals and groups, situations, countries. They also depend on culture, values and norms, the current level of service, the State-of-the- art one is in and the safety level one is used to.

Clearly, there are many kinds of needs. A much cited and adopted theory regarding needs is the Maslow theory on the hierarchy of needs. It is known as the first theory of motivations to which people are exposed. Abraham Maslow identified five fundamental needs. He argued that there is a hierarchy in human needs. People will try to satisfy *physiological needs* (air, water, food, sleep) first. When these very basic needs are more or less satisfied, *safety needs* become relevant (living in a safe area, medical insurance, job security and financial reserves). After that, *social needs* like friendship, belonging to a group and giving and receiving love become relevant, and then *esteem needs* and lastly *self-actualisation* (Maslow, 1943).

⁴⁶ Thus needs and wants are a feature of the pedestrian, whilst a requirement is to tell something about the object or service that is needed: e.g. a person needs food, food needs to be nourishing and non-toxic.

⁴⁷ When a quality need is not documented in an 'official' paper by experts or decision makers, it is not (yet) a *requirement*. People can have quality needs irrespective of documentation.

Although the Maslow hierarchy lacks scientific support, it has plausibility⁴⁸ and is frequently used to classify and prioritize needs and requirements, without taking it as a hierarchy, though. However, the idea is that there is some prioritising in the sense that people pay most attention to needs they have not yet (fully) satisfied. For instance, someone who has already eaten will not feel rewarded when food is offered to him; if safety facilities are provided, a road user will not feel a need for safety at that moment and place.

In reality, people don't necessarily work through the levels one by one, so there is good reason not to stick to rigidly to the principle of a hierarchy. In order to align Maslow's motivation theory more closely with empirical research, Alderfer created the ERG theory (Alderfer, 1969):

1. *Existence* refers to our concern with basic material existence motivators (containing Maslow's Physiological needs and Safety needs). *Health* is both a need and also, to a great part, the result of the measure to which these fundamental needs are fulfilled⁴⁹.
2. *Relatedness* refers to the motivation we have for maintaining interpersonal relationships (containing Maslow's Social needs and (internal) Esteem needs).
3. *Growth* refers to an intrinsic desire for personal development (containing Maslow's (external) Esteem Needs and Self-actualisation).

Contrary to Maslow's theory, the ERG theory does not state that lower order needs have to be satisfied before a higher order need becomes relevant. An individual can and will try to satisfy many needs at the same time. Moreover, if policy is directed at satisfaction of only one need at the time, this might frustrate the target persons (Alderfer, 1969). Seev Gasiet has changed the scheme of Maslow somewhat and eliminated the hierarchical principle of Maslow's system. He divided needs and motives into four groups (Risser & Chaloupka, 2009):

- a. Basic needs, psychological needs
- b. 'Warm' social needs (affiliation, social relationships, etc.)
- c. 'Cold social needs (dominance, 'being better' etc.)
- d. Self-verification / Competence.

In stead of a hierarchy Galiet sees a mixture of needs that are related to social principles. We need the others, but to satisfy 'cold social needs' may mean not to consider other citizens and their needs, leading to an interpersonal conflict of needs. "Competence" contains parts of the meaning of the English word 'competition', with all its advantages but also disadvantages (Risser & Chaloupka, 2009).

Maslow's theory has been the subject of much debate amongst psychologists. Risser & Chaloupka (2009) mention critics like Graves, Hofstede, Early and McClelland. Graves (1970) found that people operate much less structured in the way they satisfy their need. Hofstede (2001) and Early (1989) noted that different people with different cultural backgrounds and in different situations may have different priorities concerning needs. Other researchers claim that other needs are also significant or even more significant, like McClelland (1987), who identified needs for achievement, affiliation and power. Even Maslow (1968) himself added additional layers in his book 'Towards a Psychology of being'.

⁴⁸ However, experiments with a baby monkey that can get milk from an iron wire made surrogate mother and not from a soft cloth surrogate 'mother' show that the Maslow's hierarchy is not entirely correct. The baby monkey goes to the iron wire mother to drink, but stays more time with the soft cloth mother. Also, experiments with a baby who is given prime quality food, but no attention or physical touch show that both are badly needed. Also a number of needs are no static traits, but change over time and context (Mason, 1968).

⁴⁹ As such, health is not so much specified by Alderfer. In our context however, it is an important notion.



'It is quite clear that human needs have to be considered in connection with all work in the areas of traffic and mobility. They lie behind everything that we do. If one wants to give a special reason, here is one of them that is especially relevant for traffic and mobility: In order to make traffic and mobility function in a certain way, people have to behave in a certain way, which often is not from the start their natural way to act. For instance, the co-operation of people is needed in order to achieve goals. The participation principle that nowadays is mentioned so often is built on these basics, mostly without this fact being mentioned explicitly: Participation gives the involved persons satisfaction, among other things. This, on the other hand, needs to be interpreted in the frame of communication theories: Participation on the one hand requires and on the other hand provides a good climate between communication partners, which is the most important precondition for co-operation (Watzlawik et al. 1975).

The concepts of user needs are often used in policy papers and in traffic and mobility concepts. Obviously, basics of psychology have found their way into planners thinking, though only on a very general level. Additionally, the human and social scientific background to these concepts is hardly ever mentioned in a satisfying way. Generally, and traditionally, the field of traffic and mobility has been treated technically to a large degree, so far. Most research money has gone into technical projects. Psychology and social sciences have been largely neglected. The concepts of research, development and innovation have been associated to the technology and engineering disciplines much more. On the other hand, everything that is done in the frame of a socio-technical system is implemented with the goal to influence behaviour of human beings, and if it is not done so purposefully it does influence behaviour anyway. But without systematically gathering knowledge how behaviour is influenced by prevailing or newly implemented preconditions, a lot of resources to improve the socio-technical systems traffic and mobility will be wasted, even in the future.⁵⁰

Lapintie concluded that for the PQN project the concept of needs should be defined and analysed interdisciplinary, integrating ideas from a systems-theoretic perspective. He looked the classification of needs from the perspectives of psychology, sociology, cultural theory, ethics, social and political philosophy, architecture and planning sciences. He argues that 'simple' homeostatic or existence needs and psychological need are easily explained by psychology and sociology, but that there are many social and cultural needs that are not so self-evident. Do we need cultural services as art museums and classical music, he wonders. Sciences that are concentrated on the normative analysis and redirection of social values, such as ethics and political philosophy, need to be consulted.

One such class of needs are the aesthetic needs. Human beings and societies and societies have from early civilisations on invested in the aesthetic refinement of their environment, in addition to its mere functionality. Although aesthetic pleasure can be studied also in psychology, this is not all there is to it, since aesthetic experience can also be developed through aesthetic education and acquaintance with the arts. It is thus an inherent normative dimension studied in aesthetics as science (or philosophy).⁵¹

Like Risser, Lapintie finds it is not opportune to list needs, put them in a hierarchical order and then satisfy them one after the other. Human perception and the satisfaction of needs is more complex that.

According to Lapintie (2008) there are several levels of needs:

⁵⁰ Quote from the Risser & Chaloupka (2009) paper on 'Needs'

⁵¹ Quote from the Lapintie (2008) paper on 'The Interdisciplinary Concept of Need'.

1. Homeostatic or existence needs
2. Psychological needs
3. Aesthetic needs
4. Social needs
5. Political needs

In Table 3 the nested levels of needs, comparable to Richard's scopes regarding systems output to the environment (pictured in Figure 6). In the PQN project Lapintie's model will be used to deduce and identify the pedestrian's quality needs (see Part B Resources, on Working Group 4 results).

Table 3 Classification of needs (Lapintie, 2008)

Type of need	Definition	Relevance and problems
Homeostatic/subsistence needs	Necessity of the human physical system to maintain a set level of temperature, nutrition, activity, etc.)	Provision of shade, shelter, resting places, public wells, restaurants and cafeterias, safe crossings, etc.
Psychological needs	Necessity to reach e.g. relatedness, competence and autonomy in order to live a satisfying and meaningful life	Provision of accessible public and community spaces for meeting and communication, clear orientation and legibility, necessary control to ensure personal security.
Aesthetic needs	Preference for well-designed and/or meaningful cultural products and natural environments, can be refined through education and acquaintance with the arts	Provision of well-designed urban space, good materials and street furniture, scenic environments.
Social needs	Necessity of social groups to communicate and cooperate, as well as form social distinctions.	Provision of accessible public spaces for meeting and communication, clear orientation and legibility.
Public/political needs	Facilities and services that are considered citizens' rights that the political system is committed to. Disciplinary control/subjugation.	Provision of high-quality and accessible public spaces and public services, public transport, affordable and accessible housing, personal security, freedom to use public space within limits.
Source: Kimmo Lapintie: The interdisciplinary Concept of Need (note for WG4 10-11-2008)		

Lapintie's *Political needs* relate to values on the societal level. Risser and Chaloupka (2009) write on 'Needs, Interests, Values'⁵²:

"Values are assumptions and feelings of what is "desirable", constituted and communicated by society or parts of it. In the course of socialisation each individual internalises assumptions of certain values, and connotations that frame that value. Internalisation means that socially established values are taken over by the individual ("feelings are learned", Schachter & Singer) and adapted to the individual's perspective. Values are looked upon as commonly

⁵² The following text in italic is a quotation of the Risser and Chaloupka (2009) paper on Needs.



accepted standards for orienting ones behaviour. According to this model, the hierarchy of predominant values should be seen as influenced by the social surrounding the individual is living in and his/her own disposition of needs. With a little bit of salt, two approaches for identifying different categories of needs (interests, motives) can be found within sociological and psychological literature:

- *Life-quality aspects*: they refer to predominant values referring to societal aspects and to inter-individual comparison processes and
- *Individual needs*: they are more narrowly connected to individuals' private motives (the concept that even they are learned and internalised still being valid)

According to PLUME (Planning an urban mobility in Europe, Synthesis report on Social Aspects, Kaufmann & Risser 2005) the dimensions mentioned above – physical, psychological and social ("health" according to the WHO definition of the Ottawa Charta 1986) - are relevant with respect to the "social aspects": Health influences participation in societal activities very much and all measures that are detrimental for health cause the society costs; the psychological dimension reflects the degree to which individual needs are satisfied, and therefore is strongly connected to subjective well-being. (see table 4 and also <http://prompt.vtt.fi>).

These needs and their interaction have to be considered satisfyingly from the point of view of the citizens, in order to provide good life quality. If they are not taken care of, societal burdens will result.

Life quality	Needs
<p>The concept of life quality characterises all living conditions within a society, where societies - at least in Europe - start from the assumption that all individuals that constitute the society appreciate to have these needs fulfilled. The concept covers</p> <ul style="list-style-type: none"> • Health-care • Good education • To have work and good working conditions • Leisure time • Social environment and relations • Safety and security • Politics 	<p>The Maslow pyramid (see, e.g., Karmasin, 1993) can be used for analysing individual needs:</p> <ul style="list-style-type: none"> • Physiological needs • Safety needs • Social needs • Ego needs • Self-realization-/Identity needs

Figure 11 Life quality - Needs (Risser & Chaloupka, 2009)

Table 4 List of social aspects

General terms
Social impacts
Life quality
Societal burdens
Special terms
Health impacts
Stress and anxiety (among others as accident consequences)
Equity and fairness
Social inclusion and social exclusion
Accessibility and usability

The following discussion on the topic "Conflicts of interest", where different values relevant for society, for different groups, or for single individuals, are at stake, mainly deals with examples from mode choice in transport. The reason is that there has been done some expert work on the topic in the EU project WALCYNG⁵³. There, strategies for the transfer of short car trips to walking and cycling were to be worked out. The acceptance of alternatives to the car should be increased. Among others, the following needs of target groups were mentioned as having to do with a choice of mode, or with the reluctance to change habits in this respect (Hakamies-Blomqvist & Jutila 1997):

- ⇒ **"Objective" Safety:** to know facts concerning numbers of accidents connected to a certain mode - which is commonly equated with "safety"
- ⇒ **Security:** "subjective" safety not only meaning traffic safety, lacks of which are often felt and expressed by older persons, by cyclists, by women, by parents, by pedestrians, etc.
- ⇒ **Mobility at the micro level:** affected by barriers when crossing the road to get to the bus-stop, by waiting times at traffic lights, by the length of walking routes, by lacks in security, etc.
- ⇒ **Comfort:** convenient slopes at kerbs, weather protection at bus & tram stops, good service on public transport, short connecting routes etc.
- ⇒ **Aesthetic and environmental quality:** attractive lay-outs of stops & stations & vehicles, low noise, good air, etc.
- ⇒ **Social Communication:** the possibility to be with, or at least to be amongst, other people

Needs and conflicts between needs

It is paradoxical that what individuals love to do often leads to results that nobody wants, at the end of the day. Car drivers do not want to hurt other people, they love nature – the many who travel to be out in nature are witnesses for this – and they want that even their children and grandchildren live in a healthy environment. But it is also true that more people die on the road than in minor local wars, that ground is sealed at highly increasing speed, that fossil combustibles are rapidly vanishing, etc. What looks as an individual issue to start with – to owe and to drive a car – ends up as a societal and political problem.

This is to demonstrate that it is conflicts between needs and interests we should look at and analyse:

1. Conflicts between individual benefits and societal costs
2. Conflicts between mobility and the fact that many persons' mobility can put limits to other person's mobility (inter-individual conflicts)
3. Conflicts, e.g., between individual quality of life and destruction of the preconditions for it. e.g. driving a car in times of climate change (intra-individual conflict)

These conflicts are there since many years, probably since man exists. What is changing is their perceivability. E.g., they become more transparent, among others due to increased awareness⁵⁴: Technology and society are connected and separated at the same time: Development of technology proceeds as a relatively unplanned process and steers society without individuals knowing whether they wish the situation to be as it is. What they want is to make use of technology on an individual level. In traffic, this has led to the construction of more and

⁵³ WALKING and CYCLING instead of shorter car trips

⁵⁴ In the EU-project MASTER it showed in interview-studies in 6 European countries that people who consider themselves as pedestrians and people who consider themselves as car drivers look at traffic problems in quite different ways (see Risser & Lehner, 1998)



more roads. This produced a further increase of car traffic, and many measures are taken in order to tackle mass transport and its side effects.

Conflicts between individuals/groups and society

One can support the viewpoint that, when it is declared policy to achieve a change from cars to other modes, then people who use cars must accept disadvantages. As in the area of traffic safety, this is also the case in connection with a change in favour of less environmental pollution; there, the individual car driver has interests which go directly against those of the community, and in the area of traffic safety also, and particularly so, against the law. One can, therefore, see the conflict as one between the individual (or groups of individuals like "car drivers" and the society.

One reason for this is the following; The individual citizen does not always agree that the official position, represented by law-making and policy, and representing the society, is the right one. What is required from the society's side, especially if one feels that ones own interests are not being taken care of well, is detailed explanations as to which values⁵⁵ will be protected by the official position. The explanations given are often, in practice, inadequate. A good (or "bad") example of this is the tradition of "one-sided"⁵⁶ information. This is in Social psychology seen as disadvantageous for good persuasive work (see, e.g. O'Keefe, 1990). It has been shown (e.g. Sammer, 1986) that, as long as information credibly tries to reflect reality, people are far better able to stand difficult and contradictory information than politicians want to admit, or than they fear (see e.g. Brög, 1997). If there are also disadvantages for somebody, e.g. that old nice habits and routines have to be changed, than this has to be mentioned.

Conflicts between Groups of Individuals/between Individuals

Conflicts of interests also manifest themselves as those between different groups of citizens or between individuals (inter-individual conflicts of interest). The table below illustrates an inter-individual - or inter-group - conflict. In no way does it deal with a particularly important conflict, but gives a clear and easily-followed example. Pajunen (1993) showed that bus journeys are for the passenger a safe way of getting about. At the same time, she showed that busses are also involved in fewer accidents where others are injured. Simultaneously, in group discussions with pedestrians (in Austria), buses (i.e. their drivers) were described as inconsiderate, dangerous and "intimidating" (Risser et al. 1988). Even though they are objectively safe, buses were seen as a threat, at least by some other road users. In table 5, the conflict between bus drivers and pedestrians with regard to the aspects objective and subjective safety are illustrated (see e.g., Risser 1993 & 2000, Ballabio & Moran 1998):

⁵⁵ Values are assumptions and feelings of what is "desirable", constituted and communicated by society. In the course of socialisation each individual internalises assumptions of certain values, connotations that frame that value. Internalisation means that socially established values are taken over by the individual ("feelings are learned") and adapted to the individual's perspective. Values are looked upon as commonly accepted standards for orienting ones behaviour.

⁵⁶ In contrast to "two-sided", one-sided information focuses only on the advantages of a wanted behaviour, or the disadvantages of an unwanted behaviour, and thereby automatically relieves the information of its credibility as there are hardly any types of behaviour which have only advantages

Table 5 Conflict Bus Driver/Passenger – Pedestrian concerning objective and subjective safety

	Objective safety		Subjective safety	
	Busdriver/ passenger	Pedestrian (pd)	Busdriver/ passenger	Pedestrian (pd)
Explicit recognition as a value	Recognised by this group	Recognised by this group	Recognised by this group?	Recognised by this group
How is the value operationalised?	No accidents	No accidents	Mobility without fear	Mobility without fear
Situation	Interaction with pedestrians	Interaction with buses	Interaction with pedestrians	Interaction with buses
Evaluation: Is the value protected?	Yes	Yes	Yes	No

Source: Risser, 2000

Intra-individual or intra-group Conflicts of Interest

*Politicians who support traffic change in order to reduce e.g. environmental pollution can be assured that part of the motorists will accept, in principle, measures which reduce their own comfort if, through this, values for which they (the motorists) **also** stand will be protected. This reflects the existence of different, sometimes opposing, interests in one and the same group of individuals, or within one and the same individual: intra-individual conflicts. Individuals have different and sometimes conflicting interests. Intra-individual conflicts are among others distinguished by their context-dependency. Under certain conditions one agrees to a certain solution whereas one rejects the same solution under different conditions, when other interests are virulent.”*

Abilities

In order to satisfy his needs, a pedestrian must perform tasks like selecting a destination, deciding how to get there, choosing route, walk, react to traffic and cross streets. One needs to be able to do so mentally, physically and financially (Steg & Vlek, 2009).

A person’s abilities with regard to walking depend on several factors. Fuller (cited in Wegman et al, 2006) provided a useful, dynamic categorisation that takes into account that general competences differ from person to person and that these general competences cannot be utilized in full in concrete situations.

On the general level an individual is endowed with competences that in principle enable one to perform certain tasks. Fuller argues that an individual's competences are related to one's knowledge, skill, insight and attitudes, which depend on one's personal characteristics, training and experience. With regard to pedestrians important personal characteristics are age, gender, vehicle ownership and mobility handicaps. Age for example matters physical and mental capacities. Young children are small and cannot see over parked vehicles; their brain is not fully developed; they do not have adequate traffic and traffic communication experience etc. Older people on the other hand are confronted by diminishing sensory capacities and are more fragile than younger people. In practise gender, driver licence and vehicle ownership matter for exposure and choice options.

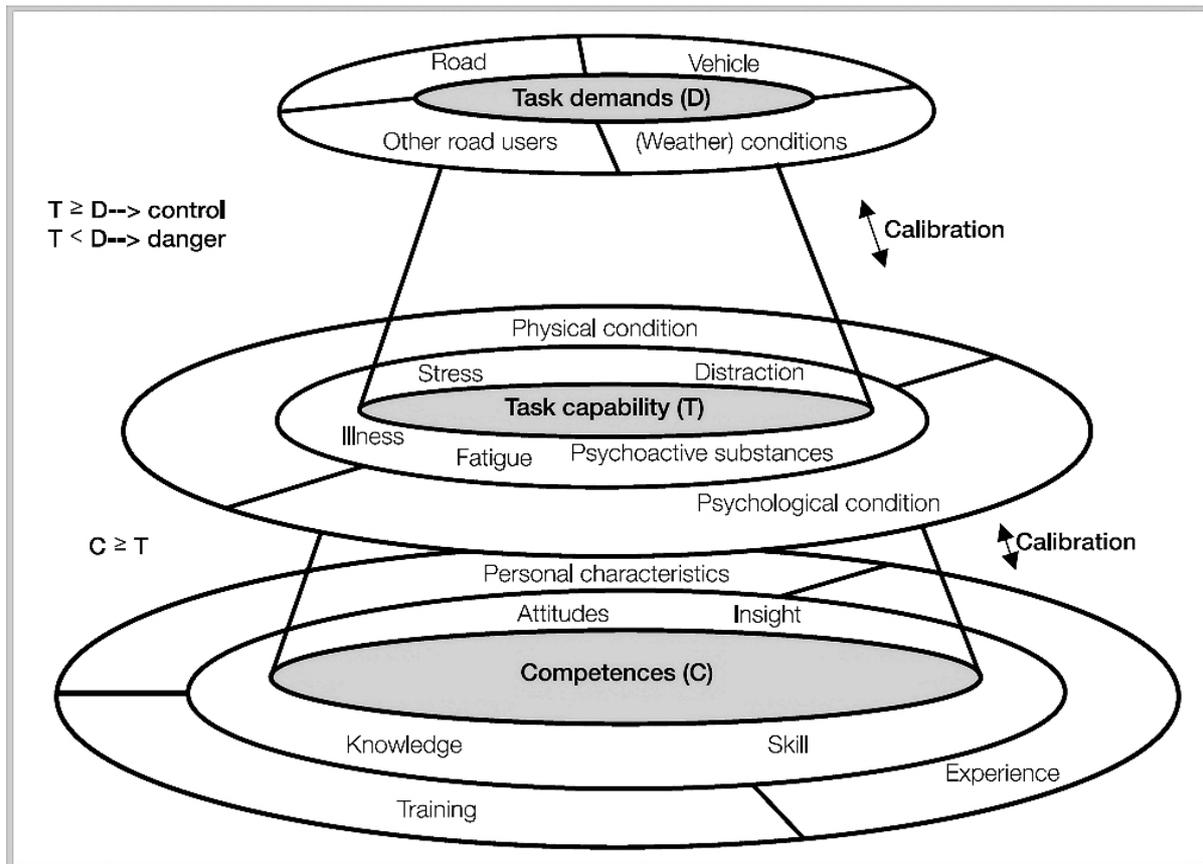
Actual task capabilities however are limited by temporary personal physical and psychological conditions, which are affected by stress, distraction, illness, fatigue and psychoactive substances like alcohol, medical and other drugs.



In turn, concrete task demands can further limit or hinder one's task performance: other road users, road conditions, the vehicle of walking aids that are used (if any) and the actual weather conditions can make it more difficult to perform adequately or can make it less attractive to be in public space.

Individuals try to calibrate their behaviour to momentary capabilities and recognised concrete conditions. For example: many elderly know that they cannot walk very fast, so they take extra care when crossing.

A schematic representation of Fuller's model is presented in figure 12.



Schematic representation of Fuller's model: task demands (D) can only be met if task capability (T) is great enough. Task capability is the result of competences (C), minus the situation dependent state.

Figure 12 Fuller's model on task demand - capability - competence (from Wegman e.a., 2006)

Opportunities

According to Webster's dictionary Bacon once said that a wise man creates more opportunities than he finds. Opportunities represent a favourable condition to execute a purpose. Time, place or conditions make it relatively easy to do what one wants to do. It is a chance for advancement, progress or profit (Wikipedia). A related concept is 'occasion', that which falls in our way, or presents itself in the course of events. Hence, occasions often make opportunities. The occasion of sickness may give opportunity for reflection (Webster's dictionary).

An opportunity may reflect to yet unidentified needs. To be relevant, the opportunity has to be recognised as such. What is an opportunity is subjective; if a situation offers a favourable circumstance, communication and education can help to recognise such opportunities.

Thus, in practise available, perceived and advertised options may represent opportunities that generate new needs and wants. A common example: the *need* or *want* to hear music while walking. Before the introduction of the Walkman and later MP3 players only a few people did feel the need to listen to music while walking. The introduction of the portable music players created the opportunity and new needs. Other examples of such emerging needs are mobile phones, led-warning lights for joggers, wheeled suitcases and sidewalk extensions at pedestrian crossings. It is to be expected that the introduction of affordable navigation software on mobile phones will create new opportunities and its own needs. They will probably present new opportunities for those who were afraid to travel to unfamiliar places for fear of getting lost.

Likewise, decreasing options to some extent also influence needs, although this relation is less clear. People get used to having certain options and expect to have them 'indefinitely'. Additional options create satisfiers (nice to have), while losing an option creates dissatisfiers (need to have).

Behaviour

Based on the above notions, concepts and models one generic conceptual framework for identifying relevant dimensions, elements and factors regarding the pedestrian's behaviour and quality has been developed. The model is presented in figure 13.

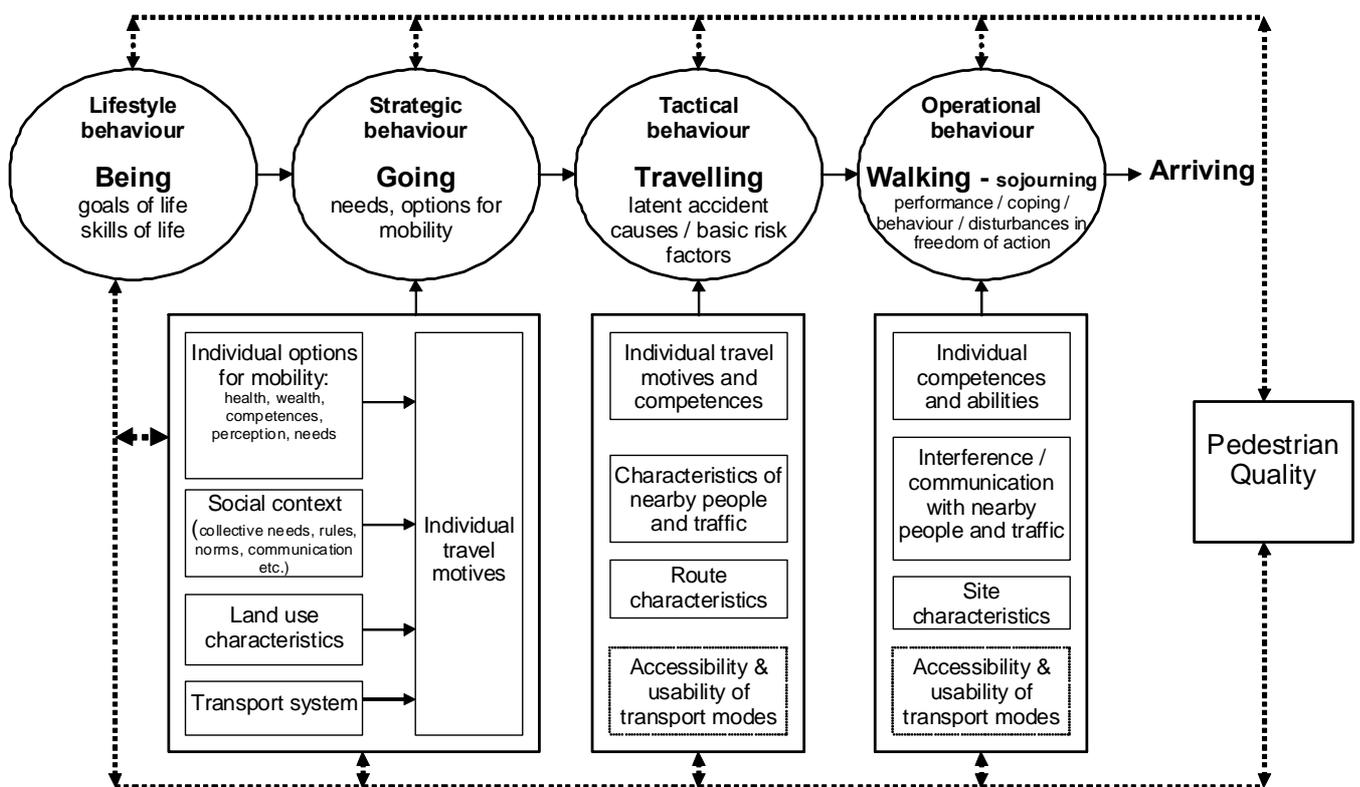


Figure 13 Basic conceptual framework Pedestrians' Quality Needs study

The Pedestrians' needs depend largely on types of decisions that have to be taken. The realisation of the decisions results in 'arriving' or 'being there'. People learn from their experiences. In other words, the end results have a bearing on future decisions. In the figure, this idea is represented by feedback arrows.

Quality for pedestrians is subjective and depends on the options for choices, the ease of the realisation process and possibly the comfort and pleasure derived from the activities on the one hand and social, economical, political and environmental factors and the perception of these conditions on the other hand (Risser, 2003, see also next section). The latter factors relate to the components identified in the Pizza Model, which represents a different categorisation of the same factors⁵⁷.

Lifestyle behavioural decisions relate to one's goals, skills of life (skills that are needed to achieve one's the goals of life) and earlier experiences and pre-conditional choices⁵⁸. Some of these decisions were taken by others, like the place of birth, residential location of children. Others were taken after long deliberation and very consciously (i.e. choice of profession, residence), just happened (i.e. ageing, family ties) or were decided in an eye's blink. Together the results of these decisions provide the personal context for activities, which can change both by new experiences, choices and because of external developments. The personal context has many dimensions: age, physical and mental condition, social relations, environmental behaviour, economical positions etc.

Strategic decisions are consciously or implicitly linked to basic needs as distinguished by Maslow⁵⁹ and others and general 'dimensions', subjective parameters or components seen at generic level of the Pizza model. Options for choice regarding the go/no go decision and modal choice depend on:

- the individual's options for mobility (his health, wealth, competences and capabilities)
- the social context (including perceived collective needs, norms, values and rules, including international regulation and economic conditions)
- the land use and physical environment characteristics (distribution of destinations, environmental qualities, absence of barriers, weather, lighting conditions etc)
- the qualities of the transport system (general traffic features, public transport qualities).

At the *tactical* level pedestrians' needs relate to more concrete factors:

- individual travel motives and competences and capabilities
- characteristics of nearby people and traffic
- route and environmental characteristics (i.e. rain, heat, wet road, looks of surroundings)
- for those who decided to use other modalities: the accessibility of the mode they had in mind (a car, the bus, the train).

⁵⁷ Risser's social, economic and political dimensions are integrated in the social context component of the pizza model, whilst Risser's environmental dimension in the Pizza model is subdivided in the transport and physical environment components. Risser's Diamond model (2000) however describes the system comprehensively; its elements are fully integrated in figure 12.

⁵⁸ For example: having positive experiences with public transport may lead to buying a season public transport ticket, making it cheap and attractive to take public transport.

⁵⁹ Maslow's and others' ideas on the hierarchy of needs will be discussed more extensively in Part B of the PQN Final Report, in the section of Working Group 4 results.

Operational decisions are influenced by:

- individual walking competences, abilities, availability of walking aids and intentions
- interference of nearby people and traffic
- site characteristics, that is availability and quality of pedestrian facilities in relation to the pedestrians abilities and perceived behavioural options
- for those that decided to transfer to other modes: accessibility of those modes.

2.5 Intervention program development

Communities generally learn from earlier mistakes and take action to prevent them from happening later on. Over time they learned to take basic precautions so that undesirable events like nuisance and accidents become rare as possible. Basic rules were issued for behaviour in public space, for the lay-out, design and construction of the environments etc. Enforcement of these rules was taken up. People were educated to comply with the behavioural rules in order to reduce collective risks of nuisance, accidents, loss of assets, chaos etc. Knowledge on the citizens' and societal needs and risks accumulated and was managed, up to a point. Thus over time an increasing part of the population could participate in community life. Safety and security also slowly, but continuously improved. In general the quality of life seemed to have improved, although for some groups more than others. Still the situation is far from perfect and changes in society, the physical environment and transportation lead to new deficiencies that need to be tackled.

Awareness is critical

A critical factor for the improvement of walking and sojourning conditions is awareness of the need for improvement at the stakeholder level. When there is no awareness of a (potential) problem, there is no chance that tackling the problem will even be considered. Providers must know and feel that there is something wrong and they must have an accurate image of what kinds of undesirable events that might happen for which in the end the community gets the bill. Clearly the perceived urgency of an issue can differ very much from priorities that are science based. With regard to the measurable effectiveness of an approach in the end policies based on facts will be more productive than policies based on perceptions that are inherently somewhat biased.

Scientific studies revealed that not all issues are equally well detected and prioritised in the same way. Important factors are visibility of an issue, the differences in scope of individuals and of providers on the collective level, perception mechanisms and the policy maturity regarding the issue in question. The effects of these biases need to be taken into account. The greater the bias, the more effort has to be taken to detect the factor and to communicate about its policy relevance.

Some problems are quite visible and obvious (first order problems), others are only detected when studied more closely (second order problems) and some basic problems are only detected if carefully looked for (third order problems; Rumar, 1999). An example of such a first order issue is reported injury accidents while crossing a street. Second order issues are for instance contributing causal factors like alcohol intoxication of a driver, which can only be detected if the accident is studied more closely. Third order issues, like social acceptability of alcohol use, are even more hidden and only detected if one asks the questions behind the answers.



Other mechanisms relate to differences in scope on the individual and collective levels. Rare events that happen to individuals can escape attention on the community level, even though such events happen regularly and have substantive impact on collective resources. For example in an average city of 100,000 inhabitants per year some 25 pedestrians are severely injured because of a fall in public space. For individuals this is a rare event; for communities it implies a substantial collective loss of some 6 million Euros per year⁶⁰ (Methorst, 2009).

The degree to which an issue is perceived to be a risk also matters. Hollander and Hanemaaijer identified 8 factors that direct perceived risk: the degree to which one takes a risk voluntary, the degree to which a risk has catastrophic potential, the degree to which it is perceived to be controllable, the degree to which it concerns a known risk, the fairness of the distribution of benefits and sacrifices, the degree to which the community benefits of taking the risk, the number of exposed and whether the risk is caused by human factors or natural causes (see Figure 14).

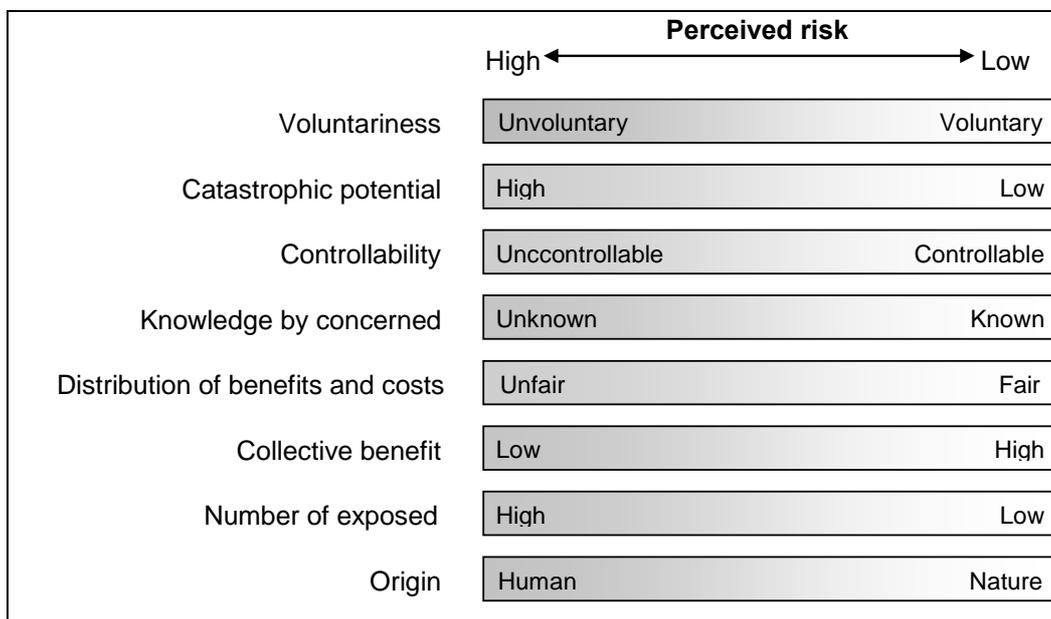


Figure 14 Directing factors of perceived risk (after Hollander & Hanemaaijer, 2003)

Obviously, the way issues are treated in the media and in ‘public opinion’ and consequently in political discussions are guided by these basic psychological mechanisms. It will take great effort and courage to overcome their effects on priority discussions regarding walking and sojourning in public space in relation to other issues, because walking scores low on almost all of these scales. In media and political discussions high scores can be successfully exploited: the problems because kids, elderly, handicapped are not allowed to use a car, the car is risky for pedestrians anyway, exposure to pollution, having to wait for public transport and the human origin of the risk.

Another ‘bias’ has to do with the State-of-the-art or maturity of policy making. Sallis et al. (2006) conclude that the traditional individual approach to promote physical activity has not proved to be very effective on the collective level. From the community’s perspective it takes too much effort to motivate the unmotivated, particularly when the individual’s environment does not support the desirable change in behaviour. The approach has to take a wider

⁶⁰ at average collective costs of a severe accident of 250,000 Euros, as valid for The Netherlands. These costs include medical costs, costs of rescue services, loss of production, material damages, litigation etc.

'ecological' perspective. This outlook matches Rumar's analysis and corresponds with Hudson et al Safety Management analysis, proposals and experiences.

In conclusion:

- the most basic precondition for improved support of walking and sojourning is awareness of deficits in the system that really matter. Factual knowledge on the functioning of the system must be acquired, disseminated and managed. It is critical that providers know what the real issues are and that they have easy access to knowledge that other stakeholders have. All stakeholders, providers, politicians, designers, researchers, citizens and the media alike, have bits and pieces of knowledge that need to be shared, but also adjusted for inherent biases that come with 'natural' mechanisms of risk perception.
- Pedestrian interest groups have proved to be a good source of information on actual issues and promising interventions. In this context it can be very useful to structurally organise communication channels between experts, decision makers, providers and user groups. Societal awareness grows if it is fed scientifically, top-down and grass-roots/bottom-up.
- With regard to the walking and sojourning issue, lack of data and information poses a serious problem that needs to be solved. In practise however there will always be gaps in knowledge and data availability. Clever strategies are needed for constructing a fair approximation of reality. The most promising approach seems to use reasoning to construct an overall picture and use empirical research data to uncover (partially) hidden issues.
- On the other hand, there is also a potential overload problem. Like all individuals, providers and decision makers get competing information all the time. Insight on the issue must be fed, supported and sustained all the time. For this knowledge and information management needs to be organised, particularly because the pedestrian issue has proven to be rather susceptible to be marginalised: the fate of common things is oblivion.

Second precondition: willingness to act

Awareness in itself is not enough to produce change. The responsible authority must be willing to take action. This will only come about when he somehow owns the problem and is stimulated to feel responsible for taking care of the issue. Risser (2009) states that the dominant mechanism in this respect concerns sacrifice and reward. Commitment decisions generally depend on the expected reward compared to the expected risks and disadvantages. The reward will always be weighed against what is expected to happen if no action is taken. If the expected reward adequately exceeds the sacrifices to be made, those who have a choice may take the initiative. If the sacrifices outbalance the expected rewards, the initiative will most certainly not be taken.

The reward can be idealistic, like 'doing the good thing', but also highly practical and materialistic. Walking and sojourning fits the current political atmosphere that favours a sustainable future. In such a context failing to support the issue might be perceived unwise because of possible negative effects. Supporting walking can possibly help delivering a green image and thereby re-election or that it yields grants from high level authorities like the European Commission or from central government like in the UK, where central government actively rewards local authority initiatives within the road safety policy framework.

Unfortunately, with regard to the walking and sojourning issue generally there are no compelling legal or cultural reasons for taking responsibility. Although almost everyone agrees that walking and sojourning conditions are important, there seems to be a general confusion about who is in charge. National government assumes that local authorities take care of the issue; local authorities sometimes hide behind lack of guidance from central



government and on the other hand assume that planners and designers have taken care of the pedestrian's interest; planners and designers assume that, since it was not explicitly asked, it was not a priority; the police refer to the citizen's own responsibility; pedestrians blame car drivers; car drivers blame careless pedestrians and negligent authorities; the elderly are afraid to ask for protection; children are unaware of their responsibilities and just play; the handicapped suffer but rarely voice their suffering or claim their right for support; courts treat pedestrian's claims as minor cases or 'acts of god'.

The problem of unclear responsibilities can be solved in a number of ways. In some cultures it can be solved nationally in a top-down way, where central government takes the initiative and defines and regulates responsibilities. In most cultures this is not a realistic option. More feasible is a solution based on agreement between relevant authorities and other stakeholders about shared and individual responsibilities. When co-operation of the public or third parties is needed, communication becomes a critical factor. Without communication decisions that need acceptance by relevant groups will not be accepted. There must be agreement on the content of the issue, on targets and on the strategy that is to be implemented (Ausserer & Risser, 2007).

Moreover, the potential partners need to be encouraged to join and invest in policy making and implementation. In most cases some kind of 'carrot' is needed. A proven solution is that central government takes initiative to approach potential partners and offers to take up a role as coordinator and provider of preconditions like legislation, research programming, knowledge management and policy guidance based on some rewarding system. The Dutch Sustainable Safety Starting-up action is a good example of this (Wegman & Aarts, 2006). A national agreement on a walking and sojourning strategy can be voiced in a National Policy Paper, defining each partner's commitment. A stakeholders' position can be defined by both formal and agreed informal tasks, responsibilities and means allocated.

Another, generally slightly more difficult solution is that an individual stakeholder on the local authority level takes the initiative to join forces with other stakeholders on a regional level. In a later stage such a form of cooperation can be up-scaled to the national level.

Currently only very few countries have explicit policies for walking and sojourning, but the general atmosphere for such policies appears to be improving because of the economic, energy and environmental crises.

Third precondition: opportunities, competences and skills

Given political or institutional willingness to take action to improve walking and sojourning, the organisation has to be able to successfully implement the plans. For this the organisation needs the authority and opportunities, the tools, the skills and the necessary support.

It goes without saying that without the proper legal authority an organisation is not allowed to implement their planned actions. On the other hand dedicated legislation, clear and accepted responsibilities supported by financial and organisational arrangements, like a national plan, provide ample opportunities for interventions to support walking and sojourning.

Lack of informal authority, that is implicit or explicit consent of affected stakeholders, can also be a powerful stumbling block, because the struggle against objections sometimes takes years and costs a lot in terms of energy, money and image damage. In this context it is essential that the plans are justified and that the justifications are properly substantiated and documented, particularly if the plans affect the interests of powerful stakeholders.

Depending on the content of the plan in most cases tools are needed for the implementation of the plans: money, manpower, a proper organisational structure and strategies, hardware,

software, monitoring instruments etc. When the plans involve participation of external parties 'sticks' and 'carrots' will be needed to motivate them to do what is expected.

The quality of policy development, substantiation and elaboration of interventions and the design and construction of concrete measures depends on education of practitioners. Currently there is little attention for walking and sojourning issues in curricula for practitioners. Apart from in some specialised institutions like the American Pedestrian and Bicycle Information Centre the status and level of expertise on the walking issue in professional education is basic at most. There are educational wrongs like disdain amongst the teachers (like 'designing walking facilities is 'girly architecture') that can and need to be tackled by supportive policy statements by central governments.

Lack of needed skills can degrade the effectiveness of implementation substantially. The interventions need to be developed, designed and managed.

The craftsmanship and knowledge needed for developing functional interventions for walking and sojourning is all too often underestimated. A common deficit is that the design is not tuned to important user groups that have special needs, like children, persons with mobility handicaps or mothers with baby buggies and shopping bags. In practise it proves to be very difficult to find showcases without serious design or construction deficits.

Another important needed skill concerns the planning, organisation and management of the implementation of the plans. Administrative support and implementation procedures need to be skilfully devised and later, monitored. Flexibility is an asset as adjustments and fine tuning will be necessary most of the times.

Correct timing is an important skill: there is hardly a worse thing than a good action at the wrong moment. For example, to start reconstruction of a pedestrian area just before the holiday season, so that pedestrian routes toward a shopping centre is not very functional when the shopping centre management decided to close down the centre for some time for renovation. Also it is not very opportune to promote the introduction of more speed humps and speed cameras when there is a fierce public debate on this issue in the media.

Communication skills can be essential for successful implementation. Although obvious the reason for a project of its design may be for the developer and designer, the justification is not always clear for the affected.

Fourth precondition: implementation

Fourthly, measures have to be truly and adequately implemented and audited much like it is become common for large motorway projects are. In practise there are still many obstacles to be conquered before the actual implementation of plans takes place. The pedestrian (!) status of walking and sojourning as yet does not encourage in depth audits into implementation quality. In high status locations like shopping centres and tourist attractions there is no real dangers of sloppy construction, use of inferior materials and little attention to quality control procedures, but all the more there is danger of low standards in common residential neighbourhoods and particularly industrial districts. It is plausible that some high profile audits into the realization of such plans can help raise their status and thereby the level quality control of future realizations.

Fifth precondition: Co-ordination and monitoring

A fifth precondition is co-ordination of activities. Duplications and gaps in coverage of the various activities and approaches must be prevented, particularly when there are more than



one implementer. The collaborating stakeholders need to gear their activities to one another. Bad organisation and un-co-ordinated activities can undermine effectiveness and efficiency of policy measures and can even be counterproductive. In order to learn from experiences and improve measures and processes, it has been proven opportune to monitor the policy implementation process, its effects and side-effects (Wijnen et al, 1993).

Intervention strategy

Knowledge is the key to successful improvement of the system. No knowledge means no awareness, which in turn implies that it is improbable that improvement action will be planned and implemented, meaning that unfavourable conditions will sustain. Therefore the first precondition for improvement of the pedestrian system is to have adequate system knowledge and issue awareness at the policy development and decision making levels. Education of key players in the field is essential. Other critical preconditions are the internal and external organisational structures of the relevant stakeholders that control the system, the maturity of their policy on the pedestrian issue and the functionality of the prevailing legislation, procedures, guidelines and rules.

Evidently there are practical and political limits to establishing such a fundament. When everything possible is done to create optimal preconditions for policy making it is time to look at the options for improving conditions at the existential activity level: management of travel and sojourn needs, abilities and opportunities, land use structure planning, land use development planning, road network classification, upgrading behavioural laws and rules, education and communication on optimal choices at the existential and strategic activity levels.

Since macro level interventions set the stage for the functioning of the system on the lower activity levels, it is sensible to start the intervention program development with looking at the practical options for intervening at the macro level, then deal with the meso level and finally with the micro level. This is called the Cascade principle (Hendriks et al 1998, Methorst, 2000).

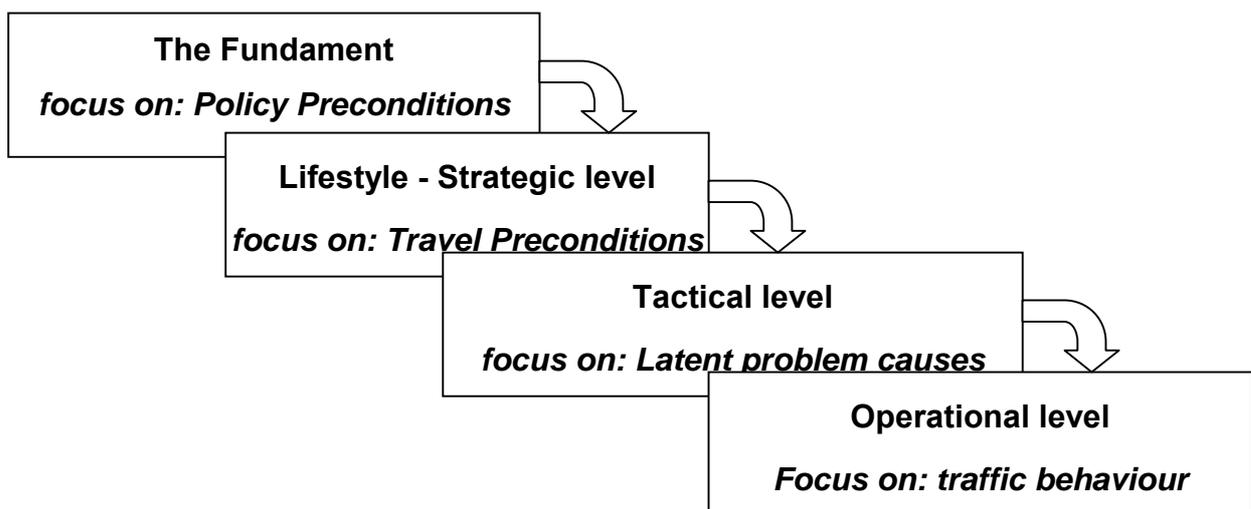


Figure 15 Cascade of interventions principle (after Methorst, 2000)

Again, when everything possible has been done to create optimal conditions on the lifestyle and strategic activity levels, within that framework it becomes opportune to look at options to improve conditions on the tactical activity level. At this level attention should be paid to

route characteristics, road design, road environment, speed management, vehicles, communication & campaigns, urban space management, network design and traffic regulation & enforcement.

Table 6 Activity levels & interventions

		Pizza model slice			
		Individual road user Pedestrian	Travel and Transportation needs Vehicle	Norms, Values Nearby humans	Land use Physical environment
The Foundation		Knowledge management, monitoring, research and Innovation Legislation Health policy development	Knowledge management, monitoring, research and Innovation Policy development Legislation	Knowledge management, monitoring, research and Innovation Attuning social norms Legislation	Knowledge management, monitoring, research and Innovation Policy development Legislation
Activity level	Lifestyle Being a pedestrian	Education	Mobility management Communication	Communication	Land Use (structure) Planning
	Strategic Going as pedestrian	Education	Mobility management Speed Management	Communication Security issues Enforcement	Land Use (development) Planning & Management Network Classification
	Tactical Traveling as pedestrian	Education	Speed Management Traffic regulation and enforcement	Communication Enforcement	Urban Space Management Network Design Traffic regulation
	Operational Walking	Education	Speed Management Education	Communication Enforcement	Urban Space and Infrastructure Design Maintenance of facilities

Within the framework of feasible optimised conditions on the tactical activity level it will be necessary to overcome the remaining deficits in the system on the operational activity level. Optional intervention types are education, speed management, communication, enforcement, improving urban space and infrastructure site design and maintenance of the available facilities. In Table 6 the intervention options are summarised.



2.6 Pedestrian system output

Changes in the pedestrian's travel & sojourn system affect its surrounding environment. These changes can go against established interests. Most probably such parties want to secure their interests and take action to undo the changes or neutralise their effects. It is therefore important to include knowledge about external effects in the policy development process. Therefore it is important that external goals and targets are assessed to create win-win situations for walkers, sojourners and competing interests.

Another reason for including external effects in the study is that the use of natural resources, human input and technology for the benefit of walking and sojourning should not compromise the ability of future generation to meet their needs, on other words: the results should be sustainable (Risser, 2003). With regard to sustainable business practice John Elkerton (Elkerton, 1997) argued that there are three kinds of consequences relevant⁶¹: social consequences (People), ecological consequences (Planet) and economical return (Profit), the so called Triple P. During the World Bank World Top of 2002 in Johannesburg the P for Profit was changed into Prosperity.

Whilst the Triple P concept covers a planet wide spectrum of consequences, including consequences for wild life and earth's resources, it can be argued that the more limited Quality of Life concept can be just as useful for assessing the output of the Pedestrian travel & sojourn system, since the negative impacts from this system to the general environment are minimal: what could be more sustainable than walking?

Quality of Life is defined by the measure to which needs (such as mobility and sojourn in - public- space) are realised. Whilst pedestrians' quality needs relate to human needs as the personae *pedestrian*, Quality of Life refers to a wider, more abstract quality, which is less limited in space and role, and will be of a more constant nature.

With regard to Quality of Life it is assumed that ultimately there is only one real type of stakeholder, being the citizen and that together citizens form society. Reality is much more complex. With regard to the output of the system several perspectives can be taken:

- abstract societal perspective
- the stakeholders' perspective
- the pedestrians' perspective
- the perspective of specific needy pedestrian groups.

Because people matter most, in the (very) long term, on the European and national level the only relevant perspective is the societal perspective, where societal expenses and benefits lead to 'one' outcome, the summed Quality of Life for all citizens. For stakeholders this is not a realistic concept, particularly because stakeholders differ in influence and power. In line with this, Risser (2003) argues that Quality of life is not only to be measured in objective parameters, but also in subjective parameters. He states that a policy where a continuous dialogue between government and public stakeholders takes place, in which both parties continuously learn to see the issues from complementary perspectives, reduces the risk of deepening misunderstanding between government and citizens. A deepening of the gap between those perspectives has a negative effect on a sustainable development and the Quality of Life of citizens.

⁶¹ 'Cannibals with Forks – the Triple bottom line of 21st century business' by John Elkerton, Oxford 1997. Although Elkerton's story is directed at commercial enterprises, in our view the arguments should apply for governments and Non Governmental Organisations as well.

Within the context of the HOTEL⁶² study, a State of the Art report was published on assessment of Quality of Life. Risser (2003, quote of the Summary of the report) concluded:

Quality of Life is a term defined in many different ways. There is no single definition, which covers the widespread field. In the state-of-the art report some Quality of Life definitions and models are summarised. In addition the interrelation between sustainability and quality of life and between traffic & mobility and quality of life is considered.

Looking back into history at the beginning Quality of Life mainly referred to material supply. The main indicator for quality of life was the Gross National Product. At the end of the 1950s quality of life was linked to non-material values, too. The idea of a "Quality of Life" with a strong qualitative ingredient was spread out over the world in the late 1960s and early 1970s, when first doubts were raised in the highly developed western societies about economic growth as the major goal of societal process.

Two distinct traditions of applied quality of life research emerged in different parts of the world: The Scandinavian Quality of Life approach and the American Quality of Life approach. The Scandinavian approach focuses on objective living conditions and their determinants. The American approach analyses the individuals' subjective experience of their lives. Nowadays, the Quality of Life research is in most cases based on both objective and subjective indicators.

Risser continues to discuss the assessment of Quality of Life. He concludes that the assessment of Quality of life not only varies from discipline to discipline, but also within disciplines. Looking at it from a more abstract level, however, he concludes that (2003, quote of the Summary of the report):

All indicators defined in the different disciplines refer quite consistently to four dimensions:

- **Social dimension**⁶³: *The social dimension covers all aspects from health, social relations, mobility, social status, etc.*
- **Political dimension**: *Under political dimension all aspects are summarised that belong to a political system e.g. political stability, possibility of participation, quality of social services, tax systems*
- **Economic dimension**: *To the economic dimension belong for instance the use of resources, economic stability and competitiveness, employment.*
- **Environmental dimension**: *The environmental dimension covers aspects like the prudent use of resources, sustainable transportation, waste minimisation, etc.*

Risser goes on to conclude that Quality of Life is closely linked to sustainability. With regard to traffic, mobility, city planning and Quality of Life it is concluded that there are more or less seven quality dimensions relevant (Risser, 2003):

More or less seven quality dimensions are relevant for the subjective well-being of road users and for the choice of mode: social climate/equity, objective safety, security, mobility, comfort, aesthetic/environmental quality, cost aspects.

Risser's ideas are summarised in Figure 16. It has to be noted that the listed indicators are abstractions of the concrete indicators, which Risser found in his literature review. For practical use the indicators need to be made operational. Furthermore, it can be argued that the listed 'objective parameters' also have a subjective side; what is meant here is that the objective parameters follow from observed features and that subjective parameters depend on indirect measurement of intentions, feelings etc.

⁶² HOTEL is an acronym for HOw To analysE Life quality. This study was done in the context of the Keys Action of the EU Fifth Framework Programme "Improving the Socio Economic Knowledge Base".

⁶³ RM: This dimension should also include emotional aspects.

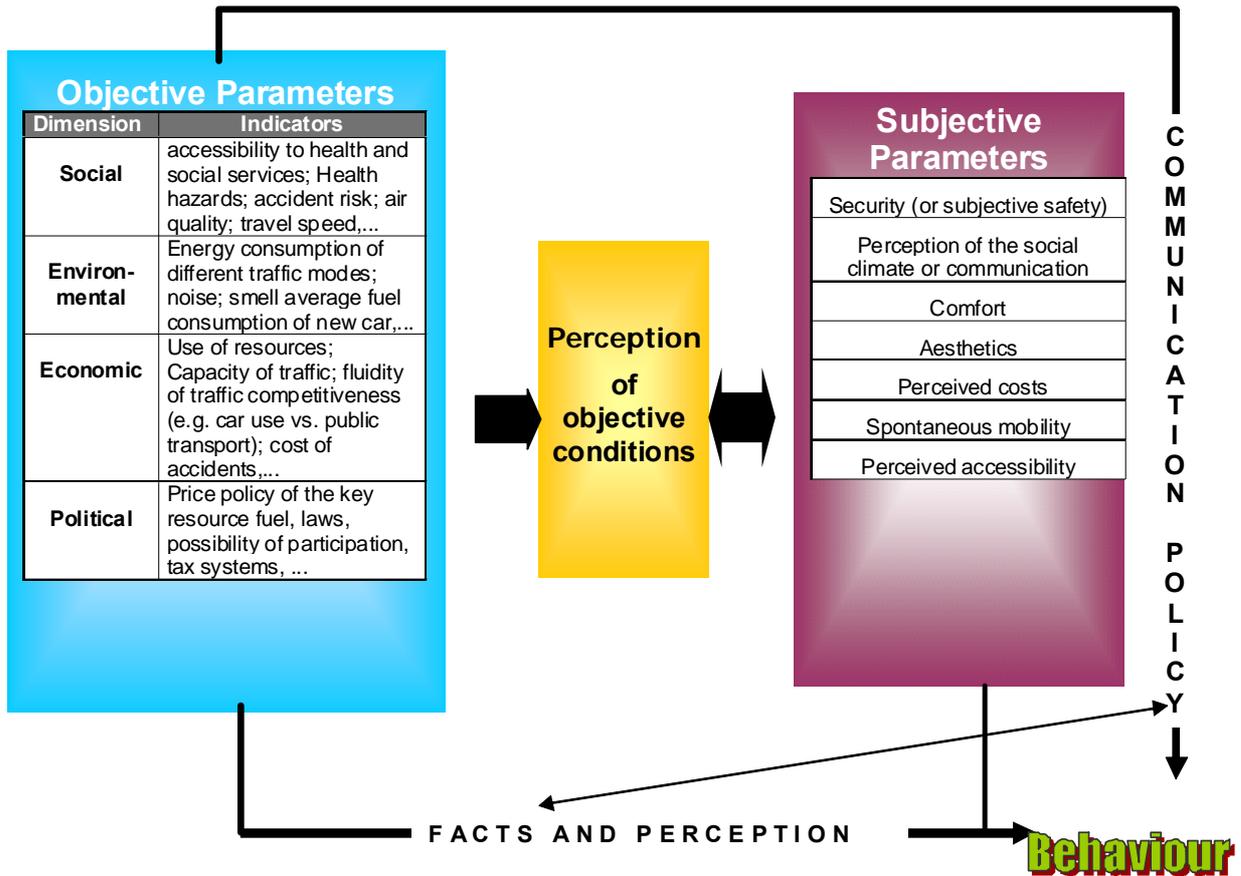


Figure 16 Parameters for Quality of Life (Risser, 2003)

2.7 Perspectives on the system.

The present study aims at identifying the general and specific needs of a specific role persons can take up, namely being a pedestrian. Therefore the model describes the process from the perspective of pedestrian needs⁶⁴. It is not meant for the use in different or wider perspectives on the collective or public level, other than as input for consideration of interests of various groups and personae in public space. The model is designed to ultimately relate to working practises of stakeholders, but not from the traditional reactive approach of solving indicated problems, but from an innovative proactive policy approach, in which the aim is to provide the best possible quality facilities for pedestrians.

The PQN conceptual framework has a very high aggregation level and is not based on data and dedicated research, but on ideas, models and theories found in literature and many discussions within the project group. One can argue that the elements in the model are

⁶⁴ Managers of the social context (authorities, railway company, bus company) have a different perspective on pedestrians quality needs. For instance: in the eyes of a railroad company good pedestrian quality on a platform in a railway station is an even distribution of pedestrians along the whole length of the platform, so that passengers can get in and out of the train in minimal time. In other words, the perspective one takes determines the valuation of quality. Good quality from one perspective does not necessarily mean good quality from other perspectives. Therefore demarcation of the perspective is very important; take into account what the dangers of taking that perspective are.

relevant. This can be substantiated easily. The framework offers the working structure. It offers an integration of many lines of thought and shows interrelationship between i.e. legislation and the design of the physical environment. It offers a first step towards a more comprehensive perspective and vision on pedestrian quality.

Although within the context of this study no attempts will be made to test the model on validity, reliability and significance, it is assumed that these be demonstrated:

- by applying the model elsewhere and looking at the results
- by testing for comprehensiveness⁶⁵
- compare it with best practises and look at the results
- deductive and inductive testing
- by further substantiating the relevance of the model.

Clearly, comprehensiveness is a key criterion for the effectiveness of a generative policy approach. It points to the consideration of all relevant elements and their interrelations, but another aspect is that all relevant perspectives are taken. David Harvey (1993) effectively illustrated the importance of this by using the example of a diorama with many peeping holes, in which a scene is displayed. Although the scene stays the same, the impression one gets out of the view from each other peeping hole, can be totally different. He argues that it is important to take as many perspectives as possible to cover an issue, because apparently the truth has many appearances.

The question now is what kinds of perspective should be taken to get a reasonably complete coverage of an issue. Obviously, it is wise to try to include all relevant disciplines in the study. Another clue is given by the Dutch Advisory Council on Land Use Planning (RARO⁶⁶). According to this Council (RARO, 1990) spatial quality can be seen as the sum of three kinds of valuations that together sketch a comprehensive picture of spatial quality. These valuations can also be applied to pedestrians' quality needs:

1. *Functional perspective:*

Functionality or usage value, relates to what is being offered and to intrinsic quality supply. It concerns looking at the system from the 'head' and searching for 'facts', thus covering first order ⁶⁷ needs and wants. This perspective particularly covers the experts' perspective and focuses on the supply side of facilitating pedestrian activity.

2. *Perception perspective:*

The perception perspective relates to what is being requested and to subjective quality needs. It concerns looking at the system from the 'heart', including attitudes towards and of pedestrians, thus searching for 'opinions' and covering second order needs and wants. On the one hand this perspective covers the pedestrians' perspective and focuses on the demand side of facilitating pedestrian activity and on the other hand on public and political opinions that influence policy making and implementation on the issue.

⁶⁵ It can be shown that a lot of so called 'integral' models are not so integral after all. In many design processes some crucial factors have been missed, like for example in the design of Amersfoort Station where car and bus traffic and aesthetics prevailed and pedestrian routes were not taken into account (Van der Spek, 2003). In many cases integral now is: traffic engineering combined with urban design. Thus security, economic aspects, noise pollution, climatic aspects are missed.

⁶⁶ RARO is the acronym for Raad van Advies voor de Ruimtelijke Ordening, the Dutch Advisory Council on Land Use Planning.

⁶⁷ according to Rumar (1999) there are three kinds of problems that need to be dealt with: first order problems, that can be identified from available data, second order problems, that come forward through dedicated studies and third order problems that are almost totally hidden.



3. *Durability and Future Prospects:*

Whilst the functional perspective and the perception perspective are mainly static⁶⁸ quality descriptions, the durability and future prospects perspective refers to a dynamic perspective and so called third order needs and wants. Durability⁶⁹ is, like user value and perception value, a relative value and depends on current qualities, future social values and future use of the physical environment and transport system. Historical developments can be described in 'objective' terms, but assessment of future prospects and durability are, because of the uncertainties involved, by nature at best expert opinions. Because interventions can have substantial impact on future developments, this kind of assessment is needed for balanced decisions that take into account, as well as we can, the interests of pedestrians in the future. It goes without saying that this perspective particularly covers the experts' perspective.

In order to get a complete and balanced picture, the three perspectives need to be collated into a fourth perspective: the integrative perspective, that seeks to find ways to balance out the different realities of the 3 'longitudinal' perspectives into coherent policy and research recommendations from the perspective of a generalised pedestrian.

2.8 Towards a functional policy process design.

In section 1.3 of Chapter 1 the basic steps towards a generative pedestrian quality policy process have been identified. In the current chapter the first step in the policy development process, namely the Modelling the system, is documented. In principle the Modelling of the system is a one-time-job, which in most cases does not have to be re-done by stakeholders. They can confine their work to taking the steps as described in the following chapter.

To be effective and efficient a policy program needs to be a well balanced mix of content, process and procedure and correctly placed and related to the actual context. Because of the great variety of situations and policy contexts our study cannot possibly cover all information and solutions needed for concrete situations; the best we can do is provide the methodology and generic information on the pedestrian issue and good or best practices.

During the Modelling of the system phase (Step 1 of the policy development process: see Figure 3 on page 22) it became clear that within the identified basics step some sub-steps are to be distinguished, particularly regarding the definition of the Intended State and the development and selection of measures to be taken.

With regard to the definition of the Intended State (Step 2 of the policy development process) in sequence, knowledge on the following aspects is needed:

- sub-step 1: Identification of quality needs, in relation to goals that pedestrians want to achieve by walking and sojourning, within the scope of their abilities. This implies assessing the needs of (groups of) pedestrians and their abilities as well as the social and political acceptability of the identified needs.
- sub-step 2: Determination of what opportunities should (at least) be provided. This covers the specification of requirements regarding the physical, social and normative environment and the transportation opportunities to be offered. In this sub-step

⁶⁸ indication of the situation at a given moment

⁶⁹ Durability and robustness are strongly related concepts. In statistics robustness is defined as insensitivity against small deviations in the assumptions. Aspects are system performance and loss of function, collapse of powers with overall consequences that are scenario dependent, robustness and vulnerability, from component design to systems design (MoU of COST TUO601, 2006).

assessment focuses on the positive effect of qualities of elements of the system, such as land use, networks design and site design, transportation options and vehicle design, safety provisions, social norms, legislation etc.

- sub-step 3: Picturing the expedient state of the system, taking into account that some needs are more important and urgent than others and that realisation of a combination of some requirements can strengthen or reduce opportunities. In this sub-step attention is to be focussed on the effect of interaction of opportunities offered, on the integration and balance of facilities on the system level and includes specification of stakeholder requirement profiles, which suit the optimal state of the system.

When the above sub-steps are taken, the *current state of the system* needs to be assessed.

- sub step 4: Evaluation of the currents state of the system. This concerns assessment and valuation of current facilities for pedestrians and services offered. This sub-step also includes assessment of available knowledge on the system by relevant stakeholders.
- sub-step 5: Evaluation of the performance and satisfaction of pedestrians within the current system with regard to the goals and desirable opportunities pictured in the description of the Intended State. This study will result in knowledge about deficits of the system as well as qualities that need to be managed and safeguarded.

Following the assessment and evaluation of the current state of the system, the next step is to *explore options for improvement*. Again some sub-steps can be distinguished:

- sub-step 6: Identification of factors, processes and mechanisms that bring about (non-) compliance or non-compliance to specified requirements and (dis-) satisfaction of stakeholders. This will include a description of common dynamics.
- sub-step 7: Identification of promising interventions. Based on knowledge of deficits and compliance and satisfaction mechanisms, available expertise on good and best practises, promising interventions can be identified.

In practise in a wider policy context it will not be possible or desirable to implement all promising interventions. There are many stakeholders involved, each covering its own domain of responsibilities and jurisdiction and having its own targets. For an optimal result a coordinating stakeholder or body needs to be appointed. In this study it is assumed that national government have the coordination and facilitator role.

Following the step of exploration of options for improvement, decisions on intervention are to be made. The actual decision process contains three sub-steps:

- sub-step 8: Assessing the potentials of interventions in a the wider context of organisational tasks, responsibilities and targets, affordability and opportunity. Although the PQN study starts from the pedestrian's needs, other interest, needs and strivings have to be taken into account; the achievement of pedestrian needs will be fit is as best as a stakeholder realistically can
- sub-step 9: Formulation of the plan including selected interventions.
- sub-step 10: the go/no-go decision on the implementation of (parts of) the plan. This vital sub-step is a political responsibility, outside the scope of the current study.

As stated, in principle the step of modelling the system does not have to re-done by stakeholders that want to improve pedestrian quality. They can confine their work to taking the steps described in sub-steps 4 to 10.

Furthermore, in the PQN project an additional step is defined as Identification of Gaps in knowledge and Best Practises. During the study process gaps in knowledge and (some) Best Practises have come apparent. Gaps in knowledge are recorded and valued for research programming; examples of Best Practises can be helpful for the identification of promising interventions.

Working Group 4 dealt with the substantiation of the discerned policy development steps. The results can be found in Part B of the PQN Final Report on Resources.



In figure 17 overview is given of the subsequent (sub-)steps in the policy development process.

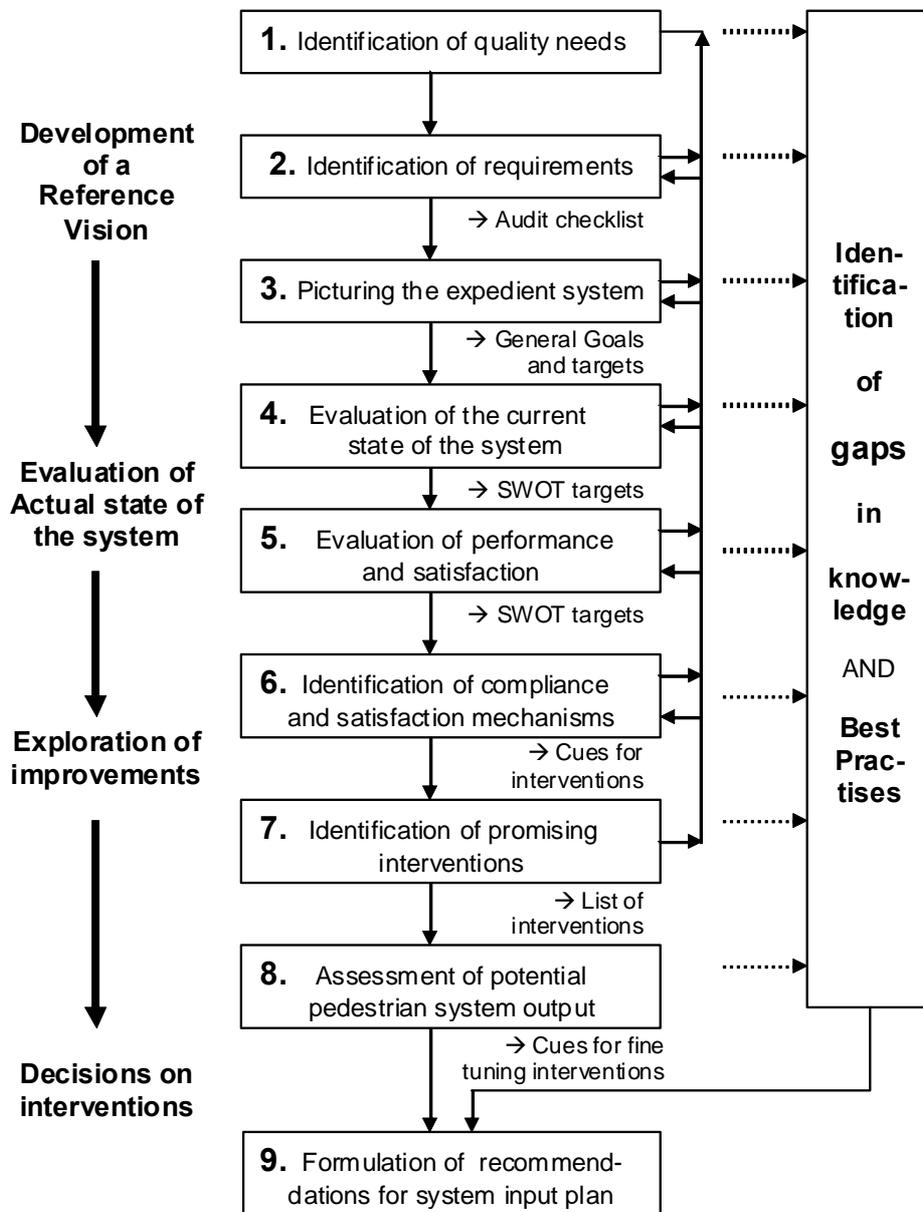


Figure 17 (Sub-)steps in the pedestrian quality policy process



3 Conclusions

*'Optimal solutions do not always exist'
Batchelor & Whelan, 1994*

Scope of the PQN project

The scope of the PQN project is to explore the frontiers of policy development and implementation regarding walking and sojourning in public space. Scientific curiosity is the main driver. The quest leads to a new, comprehensive vision on ways to improve walking and sojourning conditions. The conceptual framework for the PQN systems approach helps to make the complex system manageable, to do research planning, to check for completeness and coverage of the issue and to identify which gaps in knowledge need to be filled.

Main principles in the PQN approach

Simplified, the PQN system approach is build on three principles:

1. Start with the pedestrian
2. Analyse of the system comprehensively
3. Apply the Cascade principle for policy development and implementation.

Targeted content in the PQN Systems approach

Needs and abilities of pedestrians are givens in the policy development process. The pedestrian himself can hardly be improved or better adapted to the (lack of) qualities which his environment offers. The pedestrian's increased mobility, accessibility, safety, health and sustainability depends mostly on the degree to which opportunities are improved.

Process design

At the start of a policy development process there should be a clear vision of what general objectives should be achieved. The next difficult step is to acquire sufficient knowledge to form an image of what quality requirements should be minimally met to achieve the objectives. It can be expected that the outcome of the policy development process depends largely on the quality of the analysis in the early stages of the process. This is a difficult message for the go-getters most of us like to be.

Complexity of the issue

Contrary to the popular belief, the pedestrian issue is a very complex one. There is great variety in pedestrians and situations they have to cope with. Operational behaviour is determined by earlier tactical, strategic and even lifestyle level choices and activities. Walking differs from other modes in many ways. Contrary to other modes inter-modality is a dominant aspect. Walking is not only about travelling, but also about sojourning. For a substantial part of the population walking is the only mobility option. Pedestrians are hardly represented in disputes. Providing for pedestrians has proven to be much more difficult than providing for other modes.

Facilities for walking and sojourning are mostly collective goods. Steg & Vlek (2009) state that meaning of value assigned to collective goods is far more remote than for private goods, because these goods are shared, extend beyond one own backyard and often have a



significance far exceeding an individual lifetime. Systems approach can help to make the various stakeholders aware of this fact.

The presented Conceptual Framework for the PQN systems approach is 'work in progress' and far from perfect. It still is more complex than desirable. It probably is too complex for use by local authorities, but manageable for academics and national government to set the stage for the support of walking and sojourning.

Context of the project and application of the systems approach

The context of the PQN systems approach is stipulated by the policy maturity with regard to dealing with walking and sojourning conditions of relevant authorities.

The level of knowledge about the issue, willingness to invest and making means (staff, budget, time, organisation, communication etc) available, the level of staff competences and the quality of the implementation organisation set the stage for the success of improvement strategies. In practise it takes a lot of political courage to provide these essential preconditions for a 'common' subject like the pedestrian issue.

Many of the authorities have a strong wish to integrate tackling the pedestrian issue in other policy development processes. Particularly city planners and politicians mean that the best chance is to lift along with accepted policies that can be expected to be supportive for the pedestrian case. Experiences, however, do not always support this strategy. Although some of the general goals of accepted policies like environmental, health and safety policies seem to coincide, in most of the cases those goals can also be reached by other means as well. Those other interests do not necessarily have the pedestrian interest at heart. Proposals have to compete with other proposals that are better supported by 'hard' evidence and powerful stakeholders, which is seldom readily available for proposals that promoting walking and sojourning. The complexity and importance of the pedestrian issue and the side effects of competing measures on walking and sojourning are most often underestimated. It can be expected that the pedestrian issue will benefit most from integration at a late stage in policy processes, when integrated packages of measures supporting walking and sojourning, based on dedicated analysis, are developed and proposal argumentation is at its best.



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Appendix 1 COST 358 PQN Context

This report is an integral part on the COST 358 Pedestrians' Quality Needs project. In transport and traffic safety sciences a comprehensive, integrated systems approach is now the State-of-the-Art. This COST Action follows that path to determine what pedestrians need for their safe, agreeable and healthy mobility in public space and to show the added value of a systems approach compared with sectoral approaches. The main objective is to provide knowledge of significant pedestrians' quality needs⁷⁰ and how these needs relate to structural and functional interventions, policy making and regulation to support walking conditions across the European Union and other involved countries (COST, 2006; Methorst, 2006).

PQN is informed by and built upon research published by previous studies (including WALCYNG, ADONIS, PROMPT, Vulnerable Road Users and HOTEL). The project networks 20 countries and is supported by the COST office of the European Commission.

PQN secondary objectives were:

1. Improve the understanding of how public space, the transport system and the social, legal and political context interrelate with pedestrians' quality needs.
2. Advance the effectiveness and efficiency of future policy and research by developing a new and coherent system of concepts, theories and models which influence the quality and provision of pedestrian facilities.
3. Enable relevant organisations to work together to identify, prioritise, tackle and prevent current and future restrictions on the full potential for pedestrians by providing an accessible knowledge base and easy to use auditing tools.
4. Stimulate partners to innovate tools and disseminate knowledge that helps to shed new light on the issue and stimulate a new enthusiasm to provide for safe and agreeable mobility.
5. Provide recommendations for further research.

In the Memorandum of Understanding for the COST 358 project research questions were determined. A key question in the project is:

What facilities and qualities do pedestrians need for their safe and agreeable mobility and staying in public space, now and in the foreseeable future.

In the Technical Annex the following general sub-questions are asked:

- *What role has walking within our society? What changes occurred over time and what changes can be expected?*
- *Which tasks are pedestrians to perform? Which (implicit) requirements have to be met?*
- *To what extent is that possible?*
- *What facilities are needed to perform these tasks adequately and pleasantly?*
- *To what extent are the (implicit) requirements and provided facilities at odds? How can that be solved?*

PQN is a multi-disciplinary study, exploring the needs of pedestrians and developing models to facilitate effective and efficient integrated policy making, based on evidence, and with

⁷⁰ Needs may vary substantially from individual to individual. Special needs of minute minorities are generally not included in policy making. The COST 358 project follows this 'collective' perspective.

measurable outputs. The project started with an inventory of available statistics, national and international research and development publications with regard to pedestrians and documented policy statements of stakeholders on the various political and institutional levels. The outcome was input to working groups⁷¹ which explore the successive levels of pedestrian needs and options with regard to improvements.

Thesis objectives and central questions

The PQN project connects to a PhD study on the added value of a systems approach to quality for pedestrians. The work for the PhD is particularly focussed on developing a conceptual framework for a comprehensive study regarding pedestrian quality needs, identification of the main indicators for walkability and the development of a methodology, responsive to the needs of pedestrians, to steer effective investments which support and encourage the quality of walking on the strategic level. The study aims at demonstrating the added value of a systems approach to pedestrian quality policy development and implementation, and is to result in a picture of what a generative approach looks like. The PhD project builds on the results of discussions in the PQN working groups.

Conditions for pedestrians vary widely from country to country, region to region and even city to city. There are differences in climate, in spatial conditions, quantity and composition of traffic, legal position, culture regarding walking and presence in public space etc. These differences lead to different pedestrians' needs and make different demands on their competences and abilities. Tailored solutions for different countries, regions and cities are needed.

As a consequence of these research aims, overall research questions can be defined, as follows:

- *What facilities and qualities do pedestrians need for their safe and agreeable mobility and sojourning in public space, now and in the foreseeable future?*
- *How can dedicated facilities and qualities be realised on the strategic (national) level?*

The COST 358 Pedestrians' Quality Needs project needed to take a wider perspective. The thesis focuses on qualities that have to be met on the European and national levels, including fundamental preconditions like availability of data, information and knowledge, general visions, national legislation, a policy framework, distribution of tasks among the stakeholders and generic methodology of (desirable) interventions on local and regional levels. It could not go into detail regarding concrete measures that stakeholders can implement and their concrete design features. In the wider scope of the COST project attention is also directed to concrete arguments and options for implementation of interventions for the improvement of pedestrian qualities on the street, neighbourhood, local and regional levels.

4 Working Groups.

In the COST 358 Pedestrians' Quality Needs project the research work was distributed over 4 working groups, which are associated with the above described perspectives. The working groups did not only look at the elements and interrelations between the elements of the

⁷¹ The activities planned for the Working Groups are described in an draft overall PQN Work Plan, that was discussed at the Kick-off and accepted at the second meetings of the COST 358 Pedestrians Quality Needs project. The current report strengthens the theoretical basis and helps updating the Work Plan.



pedestrian travel & sojourn system, but also at its historical, current and desired inputs (interventions) and outputs towards the system's environment.

Working Group 1 Functional Needs

The most basic order of needs covers the 'rational' perspective of the current situation. This working group focussed on the physical and observable ('objective') needs of pedestrians, visible and objective behaviour and the 'technical' ergonomics with regard to the physical and social environment and the transport modalities.

Research explored the presence and behaviour of pedestrians in public space, and the relationship and influence of mobility, safety, physical health and exclusion.

Insight in needs and the degree to which they are satisfied was gathered by the following approaches:

- Find out what pedestrian activities, risks and ergonomic misfits are observed and reported
- Find out what recorded norms, policy objectives and solutions there are with regard to facilitating and supporting pedestrian activities
- Analyse inter-relations between offered facilities and observed pedestrian activities and risks.

In some cases standards could be recommended for land use, public spaces, infrastructure, information, legislation and transport modes and allows for the substantially different situations in the participating countries and sub-regions.

Working Group 2 Perceived Needs

The second order of needs relates to needs as they are perceived by stakeholders. This working group focused on the 'emotional' perspective and include the perception of walking and how attitudes, expectations and motivations influence behaviour of other road users, planners, policy makers and politicians, and of walkers themselves. Perceptions of physical and social environments, the transport system and their interrelations are identified.

Studies explored the perception of accessibility, comfort, safety, security, health, social climate, aesthetics and spontaneous mobility in particular.

For that purpose, at least two approaches respectively methods to analyse needs were useful:

- To ask and analyse what needs there are that should or could be satisfied in the future in order to make walking attractive, and
- To find out what needs are neglected at the moment, making walking a difficult issue.

Appropriate interventions are recommended to influence the determinants of current barriers, to breakdown institutional and social obstacles and improve the quality of life for pedestrians.

Working Group 3 Durability and Future Prospects

The third order of needs involves the dynamic perspective: how do functional needs and perceived needs evolve over the years, from past to present and what can we expect? What new policy directions are needed? This working group focused on the durability and sustainability (cf. Triple P) of interventions, designs and policy measures, and on forecasting the potentials of future usability and perceived qualities. The group explored how the needs evolve over time and what new policy directions are needed.

Studies explored trends, visions and long term changes, designs and measures that are needed to make the visions happen. Pedestrian trends and relationships with the physical and social environments and transport modalities are identified.

Working group 3 focuses on the future of walking using two approaches:

- Vision for walking: What is our vision for walking in 2030? Which interventions are necessary to achieve the vision? Which opportunities help on the way and what are the threats? Which are the benefits and who will profit from improvements?

- Effects of current trends: What are the current trends in society, in particular in transport, and what implications do they have on the future of walking and on durability? What can we learn from existing scenarios? And what are the most likely developments?

The two approaches complemented each other during the research process and were brought together in a synthesis resulting in recommendations for specific target groups. The research included functional as well as perception perspectives and was interdisciplinary involving professionals from various fields. It was probably the first European-wide attempt to look into the future of walking by comprehensively addressing social, health, economic, planning, cultural and environmental issues related to walking.

Positive and negative trends, opportunities and threats are indicated and evaluated, and the consequences of limiting the functional and perceived needs of pedestrians reported.

Working group 4 Coherence and Integration

Policy development needs to be based on the combined perspectives of functionality, perception and durability & future prospects. This 4th working group focussed on the documentation of interrelations and integration of the 3 perspectives. The conceptual framework to identify aggregated pedestrian needs and the main influences on quality and behaviour is discussed in the group.

Approaches are:

1. Theory development (systems model regarding mechanisms influencing pedestrian quality)
2. Reflection on the content of research activities of the other 3 working groups
3. Development of policy recommendations and future research.

Some important gaps in knowledge and policy processes are identified. Attempts are made to determine and justify what options policy makers and practitioners have to support both short and long term commitment to invest in the need for quality to support pedestrian activity.

As contexts, situations, individuals, groups, cultures and objectives varies greatly, it was not possible to come to one simple set of recommendations regarding desired interventions. 'Absolute' conclusions cannot be drawn. It was however possible to develop some guidance with regard to optimal procedures and provide arguments for use in concrete policy processes.

Appendix 2 Glossary

3 P's or Triple P	Triple P stands for: People, Planet and Prosperity.
5 C's	The 5 C's regarding pedestrian requirements are: Connected, Convivial, Conspicuous, Comfortable, Convenient (Gardner et al, 1996).
Ability	Ability refers to operational quality of a person of being able and having the power to perform, whether physical, moral, intellectual, conventional, or legal. Ability depends on intrinsic competences, task capabilities and concrete task demands. A schematic representation of determinants for abilities, based on ideas of Fuller (2005), is provided by Wegman e.a., 2006.
Accessibility	<p>Accessibility is a general term used to describe the degree to which a person can reach and enter a public space. It is not to be confused with usability which is used to describe how easily a thing can be used by any type of user.</p> <p>Accessibility is strongly related to Universal Design or Design for All. This is about making things accessible to as many people as possible, regardless of age, ability or personal situation.</p>
Accident	In general an accident is an unfortunate event which occurs unexpectedly and unintentionally. In the PQN project an accident is an incident where a pedestrian is <i>injured or killed</i> , in principle unintentionally; incidents where a pedestrian is injured or killed by a careless or aggressive road user in PQN are seen as accidents as well. If there is no injury, but only material damage it will be seen as an incident.
Affects	<p>Affect is the scientific term used to describe a subject's <i>externally</i> displayed mood. This external display is not necessarily the same as the actual mood of a person.</p> <p>In philosophy affect is defined as an empowerment, and not a simple change or modification. Affects are not simple affections, as they are independent from their subject. Artists create affects and percepts, "blocks of space-time", whereas science works with functions and philosophy creates concepts.</p>
Ageing	In PQN Ageing is defined as the demographic process in which the proportion of the elderly increases. The elderly normally are defined as people of 65 and older. With regard to walking elderly people of 80 years and older is a much more functional definition. Generally speaking the generation between 65 and 80 do not have serious trouble walking, except when they have one or more handicaps. One has to bear in mind that among the 80+ there are many that have an excellent condition, are able to walk quite fast and do not have any serious handicap walking. They are however more fragile than younger generations.

There is some empirical evidence that there is a 'fear factor' from speed of cars by people of over 65, that might be explained by uneasiness facing the acceleration of life in general. As a perceived risk it needs to be addressed.

Amenity	Amenities are non-monetary benefits enticing prospective pedestrians to use public space. These amenities may be in the form of tangible benefits e.g. parks, swimming pools, health-club facilities, party rooms, bike paths, community centres, doorman, garage, pet-friendly home, etc. Intangible benefits are "pleasant view", "sun-lit living room" etc. which add to the living comforts.
Assessment	Assessment is the process of documenting, preferably in measurable terms of specific qualities for the pedestrian, with regard to the person himself (including knowledge, skills, attitudes and beliefs), the social and physical environment and/or the transportation system.
Attitude	Attitudes are positive, negative or neutral views of a person or groups of persons. People can also be "ambivalent" towards a target, meaning that they have mixed feelings.
Attractiveness	Attractiveness means the capability of giving rise to confluences in most pedestrian users through appeal based on intermediate spaces configuration (form, use and structure of spaces) (definition by PROMPT)
Audit	<p>An audit is an evaluation of an organisation, system, process, project or product.</p> <p>Audits are performed to ascertain the validity of a strategy, policy or policy measure and/or the functionality and safety of a current or future situation.</p>
Barrier	<p>Barrier is used in two meanings:</p> <ul style="list-style-type: none">• in the sense of physical obstacle that makes, e.g., walking at a certain place more difficult or impossible• in the more general sense, where a barrier makes a certain type of behaviour - walking in our case - unattractive, which could be to such a degree that that behaviour - walking - is avoided
Behaviour	<p>Behaviour refers to the actions or reactions of a person or group of persons in relation to their environment. Behaviour can be conscious or unconscious, overt or covert, and voluntary or involuntary. It can also be common, unusual, acceptable, or unacceptable. People evaluate the acceptability of behaviour using social norms and regulate behaviour by means of social control.</p> <p>Behaviour only gets meaning if it is directed at other people or objects. Social behaviour is behaviour that is specifically directed at other people.</p>
Captive walkers	Pedestrians that have no choice but to walk as opposed to persons who have a choice concerning the mode to use.



Certainty	Certainty means the provision of a place to let people know where they are and where to go. It is often used as the third aspect in the triad with safety and security and closely linked to place legibility. See also Place legibility, Safety, Security.
City centre	In general the city centre is the older central area in a city, where shopping and public services are to be found. It is the showpiece of the city. Typically city centres are compact and easy to walk.
Comfort / Comfortable	<p>Comfort or Comfortable is one of the 5C's regarding to public space requirements for pedestrian. It relates to the extent to which walking is accommodated to competences and abilities of all types of pedestrians. In 'objective' functional terms comfort refers to observable usability, where pedestrians can use spaces or facilities without the apparent need to strain oneself.</p> <p>Comfort is primarily associated with positive feelings. It can however also be seen as 'no negative feelings'. Therefore, facilities are usually seen as comfortable if one does not notice anything negative (see definition in PROMPT).</p> <p>In 'subjective' terms Comfort is a state of mind, a feeling of usability without stress, uneasiness or pain.</p>
Communication (interpersonal)	Interpersonal Communication is social interaction where at least two interacting agents share a common set of signs (words, thoughts, ideas, other information) and a common set of rules to handle the exchange of those. Communication is ideally – but not necessarily - based on the respect, promises and the want for social improvement.
Competences	Competences refer to the ability to perform certain tasks. Competences are intrinsic abilities, which sometimes can be enhanced by training.
Connected / Connectivity	Connected or Connectivity is one of the 5 C's regarding public space requirements for pedestrians. It refers to the property of the infrastructure network that links trip origins to desired destinations, thus making it possible for persons to get where they want to go, as well as the extent of linkages between different routes and network.
Conspicuous	Conspicuous is one of the 5C's regarding to public space requirements for pedestrian. Conspicuous relates the measure to which an object or a facility is noticeable or eye-catching in terms of clear and legible routs, signing and information.
Constraints	A constraint is anything that prevents the system and/or the pedestrian from achieving a higher performance relative to its goal.
Convenient / Convenience	Convenient or Convenience is one of the 5C's regarding to public space requirements for pedestrian. Convenience relates to the measure to which public space or a facility suits the pedestrians' special needs, i.e. that is saves time or frustration.

"Convenience" is a very relative term and its meaning tends to change over time. What was once a convenience (a zebra crossing) is today regarded as a normal part of life. Likewise today's luxuries will probably be perceived in the same way in the future.

Convivial	Convivial is one of the 5C's regarding to public space requirements for pedestrian. Convivial connects two qualities: 'liveable' and 'together'. Convivial public space means that its design and facilities support an agreeable sojourn, that it is liveable, endurable, tolerable. Convivial public space feels safe and inviting for pedestrians, mainly because (most of the times) there are other human beings.
COST	COST is an intergovernmental European framework for international co-operation between nationally funded research activities. COST creates scientific networks and enables scientists to collaborate in a wide spectrum of activities in research and technology. COST activities are administered by the COST Office. Website: http://www.cost.esf.org
COST358	The Pedestrians' Quality Needs project is a so called COST Action. Its number is 358.
Country Report	In the Pedestrians' Quality Needs project a Country Report is a report in which the state of affairs in a country with regard to pedestrian quality and knowledge, data, information and attitudes about it are described.
Danger	<p>Danger refers to being at risk, meaning that events or conditions may occur that have a harmful or negative effect.</p> <p>Danger and Risk are related concepts. The difference is best illustrated by looking at the meaning of 'greater danger' and 'greater risk'. A greater danger implicates a larger chance on greater disaster; a greater risk points to a larger chance on a particular type of disaster.</p>
Design for All = D4A	Design for All (= Universal design = Inclusive Design) is an approach to the design of products, services and environments to be usable by as many people as possible regardless of age, ability or situation. It strives to be a broad-spectrum solution that helps everyone, not just people with disabilities. It also recognizes the importance of how things look and appeal to a wide range of potential users.
Determinants	A determinant factor is a factor that causes a (specified) effect with a certain probability.
Dimension	<p>The word Dimension can have three meanings:</p> <ol style="list-style-type: none">1. size or extent of an (physical) object2. an aspect, characteristic or quality of an concept, for example the concept of Quality of Life has an number of dimensions (such as economic, social, political, security, comfort dimensions)



3. mathematical concept: one dimensional: a line; 2 dimensional: a square or other matters that have a width and height; 3 dimensional: a cube or other objects that have width, height and depth.

Durability	Durability is not a synonym for Sustainability. Durability relates to the life cycle, the wear & tear and functionality of materials, interventions, policy programs. Conversely Sustainability refers to the absence of negative consequences for future generations from decisions taken at this moment. See also: Sustainability.
Effectiveness	An effective measure or policy is one that significantly helps to improve the situation, getting things done. Effectiveness of a measure of policy always relates to the goals that were set in advance. If no goals were set, no statement regarding the effectiveness can be given. See also: Efficacy, Efficiency.
Efficacy	Efficacy is about doing the right things to get desired results, regardless of the resources spent. See also: Effectiveness, Efficiency.
Efficiency	An efficient measure or policy is one that helps achieving goals at a minimum of resources spent. It is about doing things right.
Emotions	<p>Emotion is an intense mental state that arises autonomically in the nervous system rather than through conscious effort, and evokes either a positive or negative psychological response. An emotion is often differentiated from a feeling (Wikipedia, 2007).</p> <p>An emotion is usually experienced as a distinctive type of mental state, sometimes accompanied or followed by bodily changes, expressions or actions.</p> <p>An emotion is caused by a person consciously or unconsciously evaluating an object or event as relevant for a personally important concern.</p> <p>The core of an emotion is readiness to act and the prompting of plans (Oatley and Jenkins, 1996).</p> <p>see also Motivation</p>
Engineer	An Engineer is a professional who, given a problem and a specific set of goals and constraints, finds a technical solution to the problem that satisfies those goals within those constraints.
Everyday walking	In PQN Everyday walking is defined as walking in public space within the urban area, done for common reasons (going to school, to work, leisure, social reasons, shopping).
Existential level decisions	Decisions that precondition strategic decisions with regard to travelling in the PQN project are called 'existential'. Examples of such decisions are decisions to go live at a certain place, to accept a job, to marry and have children, to buy a year ticket for railway services, to move to a home near a train station etc.

Exposure (to risk)	Exposure is measured in terms of time spent in traffic, number of trips, total distance covered, the number of streets to cross. Exposure defines risk, which can be expressed in quantitative terms as the ratio between accidents and exposure.
Facilities	A Facility is a building, a structure, a utility, a usefully designed environment that supports doing something one needs and wants to do (i.e. talking to people, work, crossing the street).
Forecasting	Forecasting is the process of estimation of unknown (future) situations. Prediction is a similar, but more general term. Forecasting usually refers to the estimation of time series (statistical trends) see also: Foresight, Future prospects, Trends
Foresight	Foresight is a form of forecasting, but includes also events that can not be predicted by time series (statistical trends), like radical changes of attitudes regarding walking, new technologies etc. see also: Forecasting, Future prospects, trends
Fraternal review	Review of a text by other participants in the project
Future prospects	In the PQN project the assessment of Future prospects includes foresight, which includes foreseen radical changes in attitudes or technical, political or organisational innovations. See also: Forecasting, Foresight, Trends
Gender	Gender refers to the sexual distinction between male and female.
Health	In the PQN project it specifically refers to physical fitness and stress management in relation to the tasks a pedestrian needs to perform and the health benefits of transport related physical activity like walking or cycling. See also: Competences.
HOTEL	HOTEL – How to analyse quality of life – is an accompanying measure in the key Action “Improving the socio-economic knowledge base” of the EC Fifth Framework Programme.
ICTCT	International Co-operation on Theories and Concepts in Traffic Safety (the organisation that took the initiative to this project; many of the participants of the PQN project are affiliated with ICTCT); website: http://www.ictct.org
Impact assessment	Impact assessment (IA) is "a process aimed at structuring and supporting the development of policies. It identifies and assesses the problem at stake and the objectives pursued. It identifies the main options for achieving the objective and analyses their likely impacts in the economic, environmental and social fields. It outlines advantages and disadvantages of each option and examines possible synergies and trade-offs" [Source: European commission on: http://ec.europa.eu/governance/impact/index_en.htm]
Indicator	An indicator represents a synthesis of data. It is a way to represent and simplify a more complex system or knowledge.



Indicators can be tools:

- to evaluate the existing walking environment and to give suggestions for policy and strategies to apply;
- to guide stakeholders (including planners, designers and policymakers) for making interventions where the requirements for pedestrians are not met.

Every indicator can be described to specify its characteristics, its objectives, how to apply it, transversal relations, the way to measure it, the thresholds, minimum or maximum values etc.

Incident	An incident is an occurrence or event. In the PQN project the word Incident will be used as an potentially harmful event i.e. a near-accident (conflict without physical damage). Incidents can be have emotional effects.
Injured pedestrian	In the PQN project an injured pedestrian is any pedestrian that needs medical attention (at least Emergency Rescue services). Severely injured is defined as an injured person that needs to be hospitalised for at least one day and night (24 hours).
Intention	An intention is a course of action a person or organisation intends to follow in the (immediate) future, given enough perceived behavioural control and as soon as the opportunity arises.
Intended state	Intended state, desired or ideal state of the system refers to qualities of the system that people feel are needed or wanted. The intended state is generally not quantifiable.
Intervention	An intervention is a deliberate action that interferes with the course of events. In general an intervention is aimed at changing an undesired process. Intervention is rather similar to Measure; an intervention however can be unplanned, whilst a measure is always planned.
Intrinsic quality	An Intrinsic quality is an essential quality that a product or service has from itself.
Item	An item is a subject in a discussion, an entry in a list, or one object in a collection of objects. For example items in a requirement program of a PQN project are points that have to show up at a minimum, standard, maximum or optimal level.
Killed pedestrian	A killed pedestrian is a pedestrian that was involved in an accident and died within 30 days of that accident.
Life quality	Quality of life is a term that can be defined in many different ways: referred to material supply, to non-material values, in terms of objective living conditions and their determinants (Scandinavian approach), or in subjective terms as an individuals' subjective experience of their lives (American Approach).
Life style	A lifestyle refers to the way a person (or a group) lives. This includes patterns of social relations, consumption, entertainment, and dress. A lifestyle typically also reflects an

	<p>individual's attitudes, values or worldview. Having a specific "lifestyle" implies a conscious or subconscious choice between one set of behaviours and some other sets of behaviours.</p>
Maintenance	<p>Maintenance is fixing any sort of device, facility, service or policy should it get out of order, broken or dysfunctional as well as performing the routine actions which keep the device etc. in working order or prevent trouble from arising (preventive maintenance).</p>
MASTER	<p>MASTER stands for Managing Speeds of Traffic on European Roads and was a European mobility research project, in which needs and wishes expressed by pedestrians were compared to the needs and wishes of car drivers.</p>
Measure	<p>A measure is a deliberate and planned action that interferes with a course of events.</p> <p>See also: Intervention.</p>
Mental map	<p>A Mental map refers to the image a person has of his world: what his environment looks like, where elements (i.e. homes, shops, parks, friends) are placed, how they can be reached and how the elements are valued.</p>
Mental representation	<p>Mental representation refers to how something (external) is represented in one's mind. A mental model is an explanation in someone's thought process for how something works in the real world. It is a kind of internal symbol or representation of external reality, hypothesised to play a major part in cognition.</p>
Mobility	<p>Mobility is the ability and willingness to move or change house or work. In PQN this wide definition is used, contrary to common use in transport sciences and transport policy, where it is mainly seen in terms of distances covered.</p> <p>For a pedestrian mobility can depend on motor skills; mobility aids may be needed such as a walking stick, walker, mobile standing frame, power operated vehicle/scooter, wheelchair or white cane for visual impairment.</p> <p>In relation to disability, mobility refers to safety in movement and the prevention of accidents. People are able to be more mobile with vehicles and uncongested roads, public transport.</p> <p>Mobility with regard to one's home depends on availability of houses and being bound to an area because of a job or school, etc. Mobility with regard to one's job depends on availability of jobs (depending on the general job market and on one's versatility, quality, etc.), mobility with regard to one's home, etc.</p>
Model / modelling	<p>A model is a simplified representation of a real world system or (chain of) events. Modelling is the activity of simplifying and schematizes reality to a measure that it can be (more) easily understood or used for forecasting.</p>
Motivation	<p>Motivation is having the desire and willingness to do something. It refers to the initiation, direction, intensity and persistence of behaviour. Motivation is a temporal and</p>

dynamic state that should not be confused with personality or emotion. A motivated person can be reaching for a long-term goal such as becoming a professional writer or a more short-term goal like learning how to spell a particular word. As opposed to motivation, emotion refers to temporal states that do not immediately link to behaviour (e.g., anger, grief, happiness) See also <http://en.wikipedia.org/wiki/Motivation>.

Motive	In the PQN project the concept Motive refers to the reason why a person travels, walks or sojourns in public space: to go to work, shopping, visiting family, friends and acquaintances, to recreate etcetera. The word is also used as synonym for motivation.
Needs	<p>A Need is a human feature that arouses a human being to action toward a goal and the reason for action, giving purpose and direction to behaviour. There are needs on several 'levels': homeostatic (existence), psychological, social and political spheres.</p> <p>A need refers to a desired state of the system; it does not matter how that desired state is achieved.</p> <p>A need exists irrespective of satisfaction of the need.</p> <p>In the PQN project the word Needs will only be used as an individuals' or group of individuals' needs (demand-oriented) and refer to necessary qualities of the system, 'need to have'. Wants refer to qualities, services and objects that are not absolutely necessary, but 'nice to have'. A requirement is the necessity for a product or service to have one or several specified qualities (to fulfil the needs or wants of pedestrians) and is a (scientific) translation.</p> <p>See also; Requirements.</p>
NOA model	A model on Needs, Opportunities and Abilities presented by Steg & Vlek (see Steg & Vlek, 2009).
Objective quality	Objective quality, which is defined by measurable characteristics of an object or service, which can be observed by instruments like cameras, counters etc. The parameters must not be internal ones (i.e. subject to interpretation, like 'strain'). Subjective quality in turn is an individual's personal assessment and valuation of the objective quality.
Objective risk	Objective risk = (probability of an accident per exposure) x (losses per accident).
Operational behaviour	Operational behaviour relates to the pedestrians' decisions on the operational level: taken on the spot and generally highly automated; operational decisions are seldom conscious decisions. Examples are: place on the road, reaction to traffic and other persons in the environment, pushing the pedestrian light button, step aside.
Opportunity	Opportunities represent a favourable condition to execute a purpose. It is a chance of advancement. To be relevant, the opportunity has to be recognised as such. What is an opportunity is subjective. If a situation offers a favourable

	<p>circumstance, communication and education can help to recognise such opportunities.</p>
Paradigm	<p>A Paradigm is a set of practises at a certain time. Practises may include methods, theories, concepts and connected activities. The term is mostly used as Paradigm Shift, meaning that the common practises need to be changed to (better) cope with the problems. Systems Approach means a Paradigm Shift from reactive to proactive policy making.</p>
Parameter	<p>In general terms a parameter is a measurable characteristic, variable, constant or quantity of a system. In the PQN project parameter is used for simple (not composite) characteristics, whilst indicator is used for complex characteristics (a measure made up from complex data)</p>
Pavement	<p>See under Sidewalk. In British English it means both sidewalk and surface (asphalt, stones, ...) of the street/road.</p>
Pedestrian	<p>A pedestrian is any person that walks or passively sojourns in public space, not having special demands with regard to facilities because of extra ordinary walking motives, like joggers, marathon walkers and wandering outside the urban area (i.e. the mountains or woods). Also included are children using toy transportation modes and handicapped persons using walking aids like walking stick, crutches, a wheelchair or 3 or 4 wheeled electric scooters. Persons using scooters, steps, Segways or other 'aids' and transportation tools 'for fun' are excluded.</p>
Pedestrian quality	<p>Pedestrian (walking & sojourning) quality is defined by the measure to which a pedestrian can fulfil his needs: to be as free as possible in his strategic, tactical and operational decisions regarding mobility, travelling, walking and sojourning in public space.</p>
PEP	<p>PEP is the acronym for the pan-European programme on transport, health and environment (THE PEP). It is a WHO related program.</p>
Perception	<p>Perception is the end result of an individual interpretation of observations. It includes observation via all senses, processing of this information and the images and impressions. It refers to the personal filtering process (see also Representation: 'unfiltered' visual information)</p>
Peri-urban	<p>Peri-urban areas are areas that are relatively close to the urban area of a city. It involves environments where people to some extent depend on the city, but where non-urban land use like agriculture is dominant. See also: Sub-urban.</p>
Performance	<p>Performance is defined as the extent to which a requirement is met in relation to its use.</p>
Pizza-Model	<p>The Pizza model is a descriptive model of clues for options with regard to interventions in transport policy. Essentially the Pizza-model is a checklist for the assessment of the extent to which all options with regard to interventions are covered. It highlights the four main components road user, social</p>



	environment, physical environment and transportation on three levels: individual level, 'group' level and macroscopic level.
Physical quality	Quality of the physical environment described in functional or material terms
Place legibility	Place legibility refers to the measure to which public space can be 'read' easily: are there unambiguous, distinctive and recognisable cues for orientation and for assessing what one can find there, how safe it is, which behaviour is expected or to be expected etcetera. See also: Certainty
Policy (program)	A policy is a plan or approach (course of action) that is needed to achieve a certain goal. Ideally a policy leads to a coherent set of measures. Policy program is made up of a number of individual policies and measures, cemented together in an integral plan.
Policy maker	A Policy maker is a person (officer) that develops policies. In principle a policy maker does not decide on the implementation of the policy. That task is reserved for the decision maker; in governmental organisations: a politician.
Procedure	A procedure is a method, mode of operation or a routine that should be used to achieve a specified target. Thus a procedure can include steps to be taken. Procedure is different from practice , which is an established way of doing things.
Prognosis	A prognosis is a forecast. The best forecasts use foresight. See also: Forecast.
PROMPT	PROMPT stands for the research project on New means to PROMote Pedestrian Traffic in cities. PROMPT is a joint European research effort funded by the European Commission under the Key Action "The City of Tomorrow and Cultural Heritage" of its Fifth Framework Programme "Energy, Environment and Sustainable Development". The project includes six participating countries: Finland, Italy, Switzerland, Norway, Belgium and France. The duration of the project was 36 months from the beginning of March 2000 to the end of February 2003.
Public space	<p>Space where public authorities have jurisdiction. In principle this is limited to publicly owned space; privately owned property can be public space if there is no clear boundary like a fence, a wall, a door or a gate. Thus a café is not public space, whilst an outdoor café can be, provided it is not fenced off and everyone is free to use the place, for free.</p> <p>In sum: public can be defined in a legal sense and in a de facto sense. In PQN 'public' is used in the de facto sense.</p> <p>Public space should be designed, constructed and maintained in such a fashion that it is accessible for everyone, where no one is excluded and which can be used for free.</p>
Quality	Quality relates to the nature and characteristics of things. Quality is primarily associated with the (subjective) expectations people have with regard to a product or service. Quality can be defined as the measure to which the reaching

of the goal corresponds with the goal. Thus it can be described or defined in objective, measurable terms.

Often quality refers to the positive aspects or characteristics of an object, measure, service etc., meaning 'good quality'.

See also: Objective quality, Subjective quality.

Quality control	All measures taken to safeguard the quality of the results of the project, such as fraternal review, external review, judgement by the Management Committee or the Senior management Group
Quality of life	Quality of life is a term that can be defined in many different ways: referred to material supply, to non-material values, in terms of objective living conditions and their determinants (Scandinavian approach), or in subjective terms as an individuals' subjective experience of their lives (American Approach).
Requirements	<p>In the PQN project a requirement is a documented characteristic of what a particular product or service should be or do (supply-oriented). In the PQN project the word Need will only be used for needs that individuals or groups of individuals have (demand-oriented). A requirement defines the desired performance of a system, facility or service. Requirements derive from demands from users.</p> <p>See also: Needs</p>
Requisites	A requisite is synonymous to requirement .
Representation	Representation relates to the visible (photographable) environment, and is not necessarily the same as the perception, since perception is an (individual) interpretation and valuation of what one thinks to see. In the context of Representation 'objective' valuations can be given for certain quality aspects like state of repair, building style, property value.
Risk	<p>Risk = (probability of a negative event) x (losses per event). A negative event may be an accident, but also other negatively valued events. In simple terms: risk = chance x consequence.</p> <p>Danger and Risk are related concepts. The difference is best illustrated by looking at the meaning of 'greater danger' and 'greater risk'. A greater danger implicates a larger chance on greater disaster; a greater risk points to a larger chance on a particular type of disaster.</p>
Road Danger (reduction)	<p>Road danger refers to the threat posed by road (use) characteristics on a persons' physical well-being and the physical integrity.</p> <p>Road danger reduction should aim to diminish the risk for road users e.g. pedestrians by directing at the source of the problem and not, as often is done, by reducing the mobility and freedom of movement of pedestrians.</p>



Role	<p>A role is a set of interconnected behaviours, rights obligations and commitments as conveyed by actors. A role can be defined as expected behaviour in a given situation.</p>
Safety	<p>Safety is generally defined by the absence of risk or - less strict - the absence of accidents and potentially harmful incidents. One has to bear in mind however that absolute safety is not possible.</p> <p>The safety of pedestrians should always be seen within the context of mobility and accessibility. In the past safety was often achieved by excluding pedestrians and/or making places inaccessible for them.</p> <p>See also Certainty, Perception, Risk, Road danger reduction, Security, Subjective risk.</p>
Satisfaction	<p>Satisfaction is a state of mind related to the fulfilment of one's wishes, expectations, or needs and it reflects the pleasure derived from this. In this sense, factors that are positively related to the satisfaction of needs are rewarding factors and vice versa.</p>
Security	<p>Security is a condition, where one is protected against danger from the outside. The dangers are usually related to criminal activity, harassments, threats.</p> <p>The difference with safety is that safety does not focus on treats from the outside: a person can act unsafe himself.</p> <p>See also: Safety, Certainty, Risk.</p>
Severely injured	<p>Severely injured is defined as an injured person that needs to be hospitalised for at least one day and night (24 hours). See also: Injured pedestrian.</p>
Sidewalk	<p>A sidewalk is a footpath that alongside a street or road, to be used for walking. In British English a sidewalk is also called <i>pavement</i>. 'Pavement' can be a confusing term because it also means 'surface of the street/road': the asphalt or stones used for paving the road.</p>
Social role	<p>A social role is a set of interconnected behaviours, rights obligations and commitments as conveyed by actors in a social situation. A social role can be defined as expected behaviour in a given situation by an individual having a specific social status and social position.</p>
Sojourn area	<p>A sojourn area is any public space where traffic has no primacy. This can be a residential area, a park, other recreational areas, but also a shopping or an office district.</p>
Stakeholder	<p>A stakeholder is any person or organisation that has an interest in a specified matter or is able to influence the situation either negatively or positively.</p>
Standard	<p>A standard is a reference norm, a required, agreed level of quality. A technical standard is a norm that defines uniform engineering methods, processes and practices.</p> <p>A standard specification is a set of requirements for an object,</p>

	material, system or service.
	A standard procedure (or standard practice) is a set of instructions for carrying out acts, operations or functions.
State of Art	The state of the art is the highest level of development achieved at a certain moment in time.
Strategic behaviour	Strategic travel behaviour relates to decisions taken before a person goes on route. There are two types of strategic decisions: initial long term choices like where to live and where to work and day-to-day travel related decisions like to go or not to go, where to go, when and which mode. Travel motives are a key issue on this level; the travel motive determines to a large extent whether the decisions are taken consciously or that they are predominantly habitual.
Stress	Stress relate to the degree to which there is disparity between real or imagined personal experiences and personal expectations. Stress is a response that includes both physical (i.e. a ruptured tendon) and mental components (anxiety, duress, withdrawal).
Subjective quality	In principle quality is always subjective, but the term may be used as contrast to Objective quality, which is defined by the measure to which a situation is usable without strain.
Subjective risk	Subjective risk refers to a perceived risk. In general perceived risks are not expressed in mathematical, but relative terms. See also: Risk, Safety, Perception.
Subjective well being	Subjective well being refers to the degree in which a person generally feels good considering physical and/or mental conditions of life.
Suburban	Suburbs are populated areas located at the periphery of a town or city, within its formal the boundaries. Suburbs have some autonomy, where the density of habitation is usually lower than in an inner city area.
Sustainability	Sustainability refers to the absence of negative consequences for future generations from decisions taken at this moment (see also: Durability).
SWOT (-analysis)	Analysis of Strengths, Weaknesses, Opportunities, Threats of an (potential) activity: projects, proposal, intervention, measure, policy program etcetera
Systems approach	A Systems Approach is based on Systems thinking, meaning that the welfare of the system is the principal goal. The aim is to plan and provide an optimal (and possibly flawless) system, where traffic can move as freely and safely as possible. Thus the focus is <i>not</i> on fighting accidents, but on influencing risk factors within the process. The work is aimed at optimizing the process and reaching multiple targets: safe, healthy, agreeable mobility for all, 'ageing in place', community development etc. Knowing the potential users' needs is a prerequisite for an effective approach.

Tactical behaviour	Tactical pedestrians' behaviour is typified by decisions taken just before or in traffic and concern the route to be taken, walking speed, level of attention (combination with other tasks, like shopping, listening to the radio or iPod), where to cross the road, where to rest. Many of these decisions are automated and are taken unconsciously.
Technical mobility	Technical mobility refers to the 'objective' ability to be mobile. A person may be technically mobile, but unable to move because he or she <i>perceives</i> it impossible to move.
Transport system	The Transport System is made up of three kinds of elements: vehicles, infrastructure and users. The system is presumed to be devised to facilitate travelling and moving goods from A to B.
Transportation	Transportation has two meanings: <ul style="list-style-type: none">- the means (i.e. vehicles) to transport persons and/or good from A to B.- the activity of transporting persons and/or goods from A to B.
Travel accident	A travel accident is any accident that happens during travelling from A to B. This definition is wider than a traffic accident, being an accident in which at least one vehicle is involved.
Travel motive	The travel motive is defined by the activity that one wants to undertake at the destination location. If the travel motive is 'residential', than the activity of the origin location applies.
Trends	Trends can mean two things: <ul style="list-style-type: none">- a time series (i.e. mathematical function represented by linear, logarithmical, exponential trend lines)- an form of fashion, culture, relations, proportions, attitudes or needs for a certain length of time like they are being 'observed' by trend watchers. Thus not all trends can be expressed in mathematical terms. see also: Forecasting, Foresight, Future Prospects
Universal Design	Universal Design (= Design for All = Inclusive Design) is an approach to the design of products, services and environments to be usable by as many people as possible regardless of age, ability or situation. It strives to be a broad-spectrum solution that helps everyone, not just people with disabilities. It also recognizes the importance of how things look and appeal to a wide range of potential users.
Victim	In the PQN project a victim is an unfairly treated, aggrieved, hindered, injured, or even killed person. When related to road traffic or public safety, a victim is someone that is either injured or killed.
Vision	Vision can mean two things: <ul style="list-style-type: none">- inspirational renderings with regard to reaching a specified goal

- the quality of a persons visual system (visual detection and resulting perceived image)

WALCYNG

Acronym for WALKing and CycliNG, a 4th Framework (1996-1997) Programme research project on How to enhance WALKing and CycliNG in stead of shorter car trips and to make these modes safer.

WALK21

Walk21 exists to champion the development of healthy sustainable and efficient communities where people choose to walk. WALK21 features a website (www.walk21.com) and yearly conferences.

Wants

A Want indicates an existing need, which is not yet satisfied. A want is something desired, distinct from a need. It is said that people have unlimited wants, but limited supplied resources.

Wants refer to qualities of the system, services or objects that are 'nice to have' and are felt to be less necessary than Needs, which are 'need to have'. A Requirement is a documented characteristic (scientific translation) of what a particular product or service should be or do (supply-oriented).

WHO

World Health Organisation



Appendix 3 PQN Research Questions

In this Appendix the research questions, as they were discussed and agreed at the beginning of the project, are described. The aim of the listing of the questions was to provide comprehensive coverage of the pedestrian issue. In practice not all of these questions could be studied and answered. The listing however gives insight in the scope of the project.

WG 1 Functionality Needs

Working group 1 will focus on the physical needs of pedestrians, visible and objective behaviour and the 'technical' ergonomics of the physical and social environment and transport modalities.

Insight in needs and the measure to which they are satisfied will be gathered by the following approaches:

- find out what pedestrian activities, risks and ergonomic misfits are observed and reported
- find out what recorded norms, policy objectives and solutions there are with regard to facilitating and supporting pedestrian activities
- analyse inter-relations between offered facilities and observed pedestrian activities and risks.

Within the framework of the PQN project the study work will concentrate on reviewing literature, gathering available statistics and re-interpretation of available research data.

The work should result in recommendations regarding standards for land use, public spaces, information, legislation and transport modes, and will allow for substantial different situations in the participating countries and sub-regions.

The key questions with regard to this work package are:

- A. What is known about presence, mobility and safety characteristics of pedestrians in public space
- B. To what extent do initial choices regarding residence, work place, recreation and social relations influence walking options?
- C. What 'objective' factors and mechanisms determine the pedestrians' travel and/or sojourn motives?
- D. Which physical and safety needs do they relate to?
- E. What 'objective' factors and mechanisms determine the pedestrians' routing and sojourn decisions and safety precautions taken?
- F. What tasks are pedestrians to perform?
- G. To which extent are individuals able to perform these tasks and what groups can be distinguished?
- H. Which facilities and provisions are (implicitly) required for performing the tasks adequately?
- I. What are the risks?
- J. What are the (basic) risk factors and what are favourable factors?
- K. What factors determine pedestrian quality from a functionality perspective?
- L. What measures, interventions, policies and strategies can improve the pedestrians' situation?
- M. What integral policy programs need to be recommended in relation to their context?

WG 2 Perceived Needs

Working group 2 will focus on the 'emotional' perspective and include the perception of walking and how attitudes, expectations and motivations influence behaviour of road users, planners, policy makers and politicians, and of walkers themselves. Perceptions of physical and social environments, the transport system and their interrelations will be identified, because when talking about needs we refer to needs as they are perceived by stakeholders. For that purpose, at least two approaches resp. methods to analyse needs are useful:

- To ask/analyse what needs there are that should or could be satisfied in the future in order to make walking attractive, and
- to find out what needs are neglected at the moment, making walking a difficult issue.

In the frame of PQN the primary task is not to actively apply methods, which can be used to understand what needs are relevant connection with both of these approaches, although, of course, it is appreciated if partners receive national financing for carrying out such work. However, the primary task in PQN, in connection with user needs, is to check and screen what studies have been carried out in one's country during the last years that were dealing with pedestrian needs. And in connection with this, what methods have been used in order to receive certain data should be reported, as well.

The key questions with regard to this work package are:

- A. What is the perception of presence, mobility and safety in public space?
- B. To what extent do initial choices regarding residence, work place, recreation and social relations influence perceived walking options?
- C. What 'subjective' factors and psychological mechanisms determine the pedestrians' travel and/or sojourn motives?
- D. What 'subjective' factors and mechanisms determine the pedestrians' routing and sojourn decisions and safety precautions taken?
- E. What tasks are pedestrians perceived to perform?
- F. To which extent are individuals perceived to be able to perform these tasks and what groups can be distinguished?
- G. Which facilities and provisions are perceived to be required for performing the tasks adequately?
- H. What are the perceived risks?
- I. What are the perceived risk factors and what are perceived favourable factors?
- J. What factors determine pedestrian quality from a perception perspective?
- K. What measures, interventions, policies and strategies are perceived to improve the pedestrians' situation? What measure can people believe in?
- L. What integral policy programs need to be recommended in relation to their context?

WG 3 Durability and Future Prospects

Working group 3 focuses on the future of walking using two approaches:

- 1) Vision for walking: What is our vision for walking in 2030? Which interventions are necessary to achieve the vision? Which opportunities help on the way and what are the threats? Which are the benefits and who will profit from improvements?
- 2) Effects of current trends: What are the current trends in society, in particular in transport, and what implications do they have on the future of walking and on durability? What can we learn from existing scenarios? And what are the most likely developments?



The two approaches will complement each other during the research process and will be brought together in a synthesis resulting in recommendations for specific target groups. The research will include functional as well as perceptual perspectives and will be interdisciplinary involving professionals from various fields.

This will be the first European-wide attempt to look into the future of walking by comprehensively addressing social, health, economic, planning, cultural and environmental issues related to walking.

The key questions with regard to this work package are:

- A. Can an adequate model for forecasting the future of walking be developed? What will it look like?
- B. What is known about trends in presence, mobility, safety and health characteristics of pedestrians in public space
- C. What trends are there with respect to initial choices regarding residence, work place, recreation and social relations influence walking options?
- D. What factors and mechanisms determine trends in the pedestrians' travel and/or sojourn motives?
- E. What trends are there with respect to mobility and safety needs?
- F. What factors and mechanisms determine trends in the pedestrians' routing and sojourn decisions and safety precautions taken?
- G. What trends are there in tasks to be performed?
- H. Which trends are there with respect to task performance regarding the distinguished groups?
- I. What trends are there with respect to the facilities and provisions required for performing the tasks adequately?
- J. What are the trends with regard to risk (push) and favourable (pull) factors?
- K. What factors determine trends in pedestrian quality?
- L. What measures, interventions, policies and strategies can help improve the pedestrians' situation on the longer term (2030)?
- M. What integral policy programs need to be recommended in relation to their changing context?
- N. How durable are the used definitions and concepts? Why do they grow or change in time?
- O. How durable are the identified and recommended measures and materials?

WG 4 Coherence and Integration

Working group 4 will focus on the interrelationships between the first three working groups. A model will be constructed to identify pedestrian needs and the main influences on quality and behaviour.

Main responsibilities will be:

1. Theory development (systems model regarding mechanisms influencing pedestrian quality)
2. Coordination of the content of research activities of the other 3 working groups
3. Combination of the results of the working group activities into practical methods and tools, to be summarised in a handbook
4. Development of policy recommendations and future research.

Most energy will be invested stimulation and coordination of the writing activities of the project's participants and in the preparation of the dissemination of the project's results.

Key research issues for this work package are:

- A. An overview and valuation⁷² of the state of affairs (integration of the Country Reports)
- B. Progress with regard to the scientific programme
- C. Identification of valid, reliable, just and quantifiable indicators for pedestrian quality
- D. Identification of changeable, constant and irreversible factors influencing the pedestrians' situation
- E. Identification of compensatory mechanism
- F. Identification of models, concepts and theories that can help advance effectiveness and efficiency of the systems approach regarding pedestrian quality improvement
- G. Identification of a (design) theory for integrating the functional, perception and durability and future progress perspectives into one persuading paradigm
- H. An overview of the State of the Art and relevant innovations, including the ones developed in the PQN project
- I. Practical audit instruments (development of guidelines for Pedestrians' Quality Needs Audit)
- J. Recommendations for Making It Happen: what strategies are feasible and how can strategies for implementation and innovation be improved?
- K. Identification of optimal dissemination strategies and methods, agenda for action
- L. Recommendations on further research.

⁷² for example on level of service with regard to needs, preconditions, responsibilities and forgivingness of facilities and provisions.



Working Group 1 Research Questions

A	What is known about presence, mobility and safety characteristics of pedestrians in public space?
A.1	How much time is spent as a pedestrian in public space (on average, specific groups, specific situations)?
A.2	How many trips are made as pedestrian, both as door-to-door trip and as multi-modal trip (to and from other travel modes) on average and for specific groups and situations?
A.3	Which distances are covered on foot?

B	To what extent do initial choices regarding residence, work place, lifestyle and social relations influence walking decisions?
B.1	How do residence decisions influence wealth, health and walking options?
B.2	How do employment decisions influence wealth, health and walking options?
B.3	How do lifestyles influence health and walking options?
B.4	How do social relationships influence health and walking options?

C	What 'objective' factors and mechanisms determine the pedestrians' travel and/or sojourn motives?
C.1	Which (individual) physical health & competences factors and mechanisms determine the outcome of strategic decisions with regard to walking? To what extent are people in this regard free in their travel and sojourn decisions?
C.1.1	Which groups can be distinguished with regard to those factors and mechanisms? (i.e. health, wealth, competences on the strategic level)
C.1.2	To what extent is their mobility suppressed?
C.1.3	What physical and safety needs are involved? What are the consequences?
C.1.4	What does it take to improve or deteriorate the situation (significantly)?
C.1.5	What is the correlation between pedestrian needs with public transport stops accessibility
C.2	To what extent does one's social context determine travel and sojourn decisions?
C.2.1	Which fundamental groups (of pedestrians) can be distinguished with regard to social context (i.e. employment situation, family situation, collective needs, formal rules and formal norms)?
C.2.2	To what extent is their mobility demonstrably suppressed?
C.2.3	What does it take to improve or deteriorate the situation (significantly)?
C.3	Which Land Use and Physical Environmental characteristics determine travel and sojourn decisions with regard to walking (i.e. distance, building density and type, barriers, slope, height differences, atmospheric conditions, user/environment interface, dem
C.3.1	What are the most important factors?
C.3.2	How strong is this relationship?
C.3.3	Is the outcome related to other factors and mechanisms?
C.3.4	What are the 'threshold values' with regard to go - no go decisions?
C.4	Which transport system characteristics determine the outcome of strategic decisions regarding walking (i.e. quality of road network, public transport system, distance to PT stops, traffic flow, comfort, speed, travel time, travel, transportation and traff
C.4.1	What are the most important factors?
C.4.2	How strong is the relationship?
C.4.3	To what extent can adverse transport systems characteristics impede the pedestrians' safe mobility?
C.4.4	Is the outcome related to other factors and mechanisms?
C.4.5	What are the 'threshold values' with regard to go - no go decisions?

C.4.6	Qualities Interchange points, particularly public transport stops
C.5	To what extent can ITS improve pedestrians' mobility options and safety?
C.5.1	What practical experiences are there?
C.5.2	Under what conditions can ITS help?
C.5.3	What would be the requirements?

D Which physical and safety needs do the above factors relate to?	
D.1	Health
D.2	Wealth
D.3	Freedom of movement and sojourn (mobility)
D.4	Safety (road safety, public safety, security)
D.5	Relatedness
D.6	Growth

E What 'objective' factors and mechanisms determine the pedestrians' routing and sojourn decisions and safety precautions taken?	
E.1	Which (generic) personal characteristics determine one's tactical travel and sojourn decisions and safety precautions? What are the risk factors?
E.1.1	To which extent do travel motives determine the pedestrians' tactical behaviour (including mono and multi modal trips)
E.1.2	To which extent do fitness, abilities and impairment (drugs, alcohol, fatigue) determine the pedestrians' tactical behaviour
E.1.3	To which extent does available time / time pressure influence tactical behaviour, i.e. substandard route, speed and safety precautions choices
E.2	To which extent do social environmental factors influence route, sojourn and safety precaution decisions? Or, how do characteristics of nearby people interact with the pedestrians' tactical behaviour?
E.2.1	To which extent does general information (incl. street signs, signposts, billboards and ITC) determine tactical behaviour?
E.2.2	To which extent does legislation and formal norms influence tactical behaviour?
E.2.3	To which extent does social organisation (including employment) influence tactical behaviour?
E.2.4	To what extent does the presence of other social groups influence the pedestrians' tactical behaviour. What observable factors determine this influence?
E.2.5	How do traffic characteristics interact with the pedestrians' tactical behaviour?
E.3	Which physical environmental factors determine one's routing and sojourn decisions and safety precautions?
E.3.1	How do route characteristics interact with the pedestrians' tactical behaviour
E.3.2	How do characteristics of the built environment influence the pedestrians' tactical behaviour (i.e. Kevin Lynch's <i>Place Legibility</i> factors: paths, edges, districts, nodes, landmarks)?
E.3.3	How do ICT options, chances and requirements influence the pedestrians' tactical behaviour?
E.4	How and to what extent does accessibility of transport modes influence the pedestrians' tactical behaviour?
E.4.1	Availability and accessibility of personal modalities (bicycle, moped, motorcycle, car, ...)
E.4.2	Availability and accessibility of collective modalities (Public transport modes, taxi, touring cars,...)
E.5	To which needs do the found determinants relate?
E.5.1	Health
E.5.2	Wealth
E.5.3	Freedom of movement and sojourn (mobility)
E.5.4	Safety (road safety, public safety, security)
E.5.5	Relatedness

E.5.6	Growth
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F	What tasks are pedestrians to perform?
F.1	Tasks on the strategic level
F.2	Tasks on the tactical level
F.3	Tasks on the operational level

G	What are humans functionally able to do (observed behaviour) and what groups can be distinguished?
G.1	Mental abilities concerning walking (i.e. observed differences in competences and substandard acts, observed attention)
G.2	What functional preconditions are necessary for (acceptable) safe mobility with respect to physical and social environment and transportation access? (i.e. observed differences in competences and substandard acts, functional needs. How do they connect? What makes them connectable? When is a person 'fit' to be a pedestrian? What are the critical levels?)
G.2.1	Children
G.2.2	The elderly
G.2.3	The handicapped
G.2.4	other groups
G.3	What are the consequences of limitations and functional impairments (i.e. medical assessment of physical and mental abilities on the strategic, tactical and operational levels)
G.3.1	Children
G.3.2	The elderly
G.3.3	The handicapped
G.3.4	other groups
G.4	Which populations can be distinguished, how large are these populations and how severe are their impairments with regard to their safe mobility?
G.5	How does the group's health situation interact with strategic, tactical and operational mobility (observed behaviour)? How do groups perform?
G.6	Interference of nearby people and traffic; operational disturbances
G.7	Reaction to site characteristics; operational disturbances
G.8	Accessibility of transport modes; operational disturbances
G.9	Crossing behaviour
G.10	Conflicts with other road users and people in the vicinity
G.11	What do pedestrians know about traffic rules

H	What facilities and provisions are (implicitly) required for performing the tasks adequately?
H.1	What facilities and provisions are required for adequate decisions on the strategic level?
H.2	What facilities and provisions are required for adequate decisions on the tactical level?
H.3	What facilities and provisions are required for adequate decisions on the operational level?
H.3.1	How can pedestrian traffic lights be optimised?
H.4	What best practises are there (i.e. from Malls and Airports)?

I	Actual risks, accidents and victims
I.1	Number and types of accidents
I.2	Number and types of accidents per million trips
I.3	Number and severity of injuries and fatalities
I.4	Other safety issues



I.4.1	to what extent do the injuries from pedestrian collisions with SUV's and MPV's differ from other injuries (higher collision point crashes)?
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J	What are the (basic) risk factors and what are favourable factors?
J.1	What are the (basic) risk factors due to the pedestrians' choices and behaviour on the strategic, tactical and operational levels?
J.2	What are the (basic) risk factors due to choices and behaviour of the social environment on the individual, group and societal level, including norms and values?
J.3	What are the (basic) risk factors due to characteristics of the physical environment?
J.4	What are the (basic) risk factors due to characteristics of transportation facilities
J.5	How do the factors and characteristics interact?

K	What measures, interventions, policies and strategies can improve the pedestrians' situation?
K.1	What education and communication measures can improve the pedestrians' situation? To what extent? Under which conditions?
K.1.1	What can be expected from pedestrian safety public campaigns?
K.2	What changes in formal norms and values (legislation, recommendations, guidelines etc.) help to improve the pedestrians' situation? To what extent? Under which conditions?
K.2.1	Case: Why is Sweden removing zebra crossings on a large scale? What is the philosophy? What are the effects? How does the pedestrian now cross the streets?
K.2.2	Are there other cases regarding changes in institutional norms, values, guidelines?
K.2.3	To what extent can safety audits help?
K.3	What changes in infrastructure, public space design and land use features can help to improve the pedestrians' situation? To what extent? Under what conditions?
K.4	What changes in transportation can help to improve the pedestrians' situation? To what extent? Under which conditions?
K.5	What ITS measures can improve the pedestrians' situation? To what extent? Under which conditions?
K.5.1	ITS measures for daytime / all day use?
K.5.2	ITS measures for night time use?
K.6	How do the above measures interact?
K.7	How can performance of authorities and other responsible stakeholders be measured and compared (Benchmarking)

L	What integral policy programs need to be recommended in relation to their context?
L.1	What issues should be targeted by local authorities, private companies, regional authorities, national authorities, European Commission and other stakeholders?
L.2	What elements should be included in the development of policy plans?
L.3	How can measures – from a functionality point of view - best be prioritised?

M	To what extent do the various dimensions determine the pedestrians' quality of life?
M.1	To what extent do the various dimensions[1] determine the pedestrians' quality of life?
M.2	What are the best indicators for the pedestrians' Quality of life? How can walking be valued objectively?[2]
M.3	What (fundamental) needs do these parameters relate to?
M.4	Which items should be included in (minimum and optimum) requirement programs? Which standards should be met?
M.5	To what extent can ITS applications be effective in fulfilling the pedestrians' needs?
M.6	What is known about determinants for pedestrian quality in suburban and peri-urban situations? What is the role of city and land-use planning?



Working Group 2 Research Questions

A What is the perception of presence, mobility and safety of pedestrians in public space? How important is walking?	
A.1	How do pedestrians perceive their presence, mobility and safety in public space? How important is walking? What for? What is important? How far can one be expected to walk?
A.2	How do other space users perceive the pedestrians' presence, mobility and safety in public space? How important is walking? What for? What is important? How far can one be expected to walk?
A.3	How do providers perceive the pedestrians' presence, mobility and safety in public space? How important is walking? What for? What is important? How far can one be expected to walk?
A.4	How do policymakers perceive the pedestrians' presence, mobility and safety in public space? How important is walking? What for? What is important? How far can one be expected to walk?
A.5	How do opinion leaders/makers (i.e. the media) perceive the pedestrians' presence, mobility and safety in public space? How important is walking? What for? What is important? How far can one be expected to walk?

B To what extent do initial choices regarding residence, work place and social relations influence perceived walking options?	
B.1	What factors and mechanisms determine the outcome of choices regarding preconditions influencing perceived walking options? Which factors make people decide not to walk?
B.2	idem, point of view of providers, policy makers and opinion leaders.
B.3.	To what extent do children's rights to walk to school relate to their health and to their behaviour when they are adults?
B.4	Relation of housing preferences to walking options

C What 'subjective' factors and psychological mechanisms determine the pedestrians' travel and/or sojourn motives? What groups can be distinguished?	
C.1	Needs
C.2	Motives
C.2.1	What are the consequences of developments in sports towards walking (i.e. the Nordic Walking mania, more walking sticks, more pedestrians on the road?)
C.2.2	Developments in willingness to walk; acceptability of walking distances etc.
C.2.3	Which factors (behavioural indicators) promote or lower safe mobility?
C.3	Intentions
C.4	Restraints and counter forces

D What 'subjective' factors and mechanisms determine the pedestrians' routing and sojourn decisions and safety precautions taken?	
D.1	How do (the various groups of) stakeholders perceive their situation and environments on before and during their stay in public spaces (strategic, tactical and operational levels)? What is known with respect to 'objective' indicators as found in WG1?
D.2	Which psychological (perception) factors and mechanisms determine the outcome of strategic decisions with regard to walking? (N.B. points of view of all different groups of stakeholders)
D.3	To what extent feel people free in their travel and sojourn decisions?

E	What tasks are pedestrians perceived to perform (for all stakeholders)?
E.1	Tasks on the strategic level
E.2	Tasks on the tactical level
E.3	Tasks on the operational level
E.4	What fundamental differences are there with respect to the perception of the various groups of stakeholders

F	To which extent are individuals perceived to be able to enjoy and perform these tasks and what groups can be distinguished?
F.1	What are the perceptions of stakeholders with regard to what humans are able to do?
F.2	What are the perceived consequences of limitations and functional impairment on the strategic, tactical and operational levels? How does one's health interact with one's strategic, tactical an operational decisions?
F.3	How do the various groups think they perform?
F.4	To what extent can physical activity support one's (extended) safe mobility and agreeable sojourn in public space?
F.5	How does the group's health situation interact with strategic, tactical and operational mobility? How do the groups perform?
F.6	What are the consequences for the critical individual's and the general population's perception of quality of life?
F.7	Given human and mental competences, what requirements are there with respect to the physical and social environments and access to transportation on the micro, meso and macro levels?

G	Which facilities and provisions are perceived to be required for performing the tasks adequately?
G.1	What are the consequences for the critical individuals' and the general populations' perception of pedestrian quality?
G.2.	Landscape architecture, aesthetics, urban design

H	What are the perceived risks compared with other risks?
H.1	How do the various groups of pedestrians perceive the risk they bear compared with other risks?
H.2	How do other users of public space perceive the risks of various groups of pedestrians compared to their own risks? What are the consequences?
H.3	How do local authorities, the police and other 'providers' perceive the pedestrians' risks compared to other users?
H.4	How do policymakers perceive the pedestrians' risks compared to other users?
H.5	How do the media perceive the pedestrians' risks compared to other users?

I	What are the perceived risk factors and what are perceived favourable factors?
I.1	Which factors determine risk perception?
I.2	What factors are believed to influence risks (all stakeholders views)
I.2.1	To what extent is mixing of pedestrians with other road users acceptable? When? Where?

J	What factors determine pedestrian quality from a perception perspective?
J.1	What are the perceptions of stakeholders with regard to walking and pedestrian qualities?

J.2	How does this image affect transport and public space related policies of 'consumers', providers and policy makers
J.3	

K	What measures, interventions, policies and strategies are perceived to improve the pedestrians' situation? What measure can people believe in?
K.1	Measures on the local level
K.2	Measures on the regional level
K.3	Measures on the national level
K.4	Measures on the European level
K.5	Measures by non-governmental institutions
K.6	

L	What integral policy programs need to be recommended in relation to their context?
L.1	Programs on the local level
L.2	Programs on the regional level
L.3	Programs on the national level
L.4	Programs on the European level
L.5	Programs by non-governmental institutions

M	To what extent do the various dimensions determine the pedestrians' quality of life?
M.1	To what extent do the various dimensions determine the pedestrians' quality of life?
M.2	What are the best indicators for the pedestrians' Quality of life? How can walking be valued?
M.3	What perceived needs do these parameters relate to?
M.4	Which items should be included in (minimum and optimum) requirement programs? Which standards should be met?
M.5	To what extent can ITS applications be effective in fulfilling the pedestrians' needs?

Working Group 3 Research Questions

A	Can an adequate model for forecasting the future of walking be developed?	
	A.1	What models are there with regard to predicting the future of walking?
	A.2	What are the requirements for an adequate model?
	A.3	If needed, how can a practical model be built? What can the various disciplines contribute in this respect?

B	What is known about trends in presence, mobility, safety and health characteristics of pedestrians in public space	
	B.1	Developments in general internationally, groups of countries and deviant countries
	B.2	Developments for specific risk groups
	B.3	Developments with regards to city centres and to sub-urban and peri-urban areas
	B.4	Developments with regard to the relative importance of walking

C	What trends are there with respect to initial choices regarding residence, work place, recreation and social relations influence walking options?	
	C.1	How durable are structures and policies with regard to residence, work place and essential destinations?
	C.2	To what extent will choices evolve?

D	What factors and mechanisms determine trends in the pedestrians' travel and/or sojourn motives?	
	D.1	Factors relating to social context (inc. employment, social motives)
	D.2	Factors relating to the physical environment and land use
	D.3	Factors relating to transportation options
	D.4	Factors relating to ICT
	D.5	Interrelations

E	What trends are there with respect to mobility and safety needs on the strategic, tactical and operational levels?	
	E.1	National and regional trends (country or situation specific trends)
	E.2	European trends
	E.3	Global trends

F	What factors and mechanisms determine trends in the pedestrians' routing and sojourn decisions and safety precautions taken?	
	F.1	Factors and mechanisms on the strategic level (i.e. preconditions, experiences)
	F.2	Factors on the tactical level
	F.3	Factors on the operational level (i.e. perceived competences with regard to tasks to be performed)

G	What trends are there in tasks to be performed?	
	G.1	Trends in general
	G.2	Trends with respect to specific groups, groups of countries, deviant countries



H	Which trends are there with respect to task performance regarding the distinguished groups?	
	H.1	Trends in general
	H.2	Trends with respect to specific groups, groups of countries, deviant countries

I	What trends are there with respect to the facilities and provisions required for performing the tasks adequately?	
	I.1	Trends in general
	I.2	Trends with respect to specific groups, groups of countries, deviant countries

J	What are the trends with regard to risk (push) and favourable (pull) factors?	
	J.1	What are trends with respect to risk factors?
	J.2	What trends are there with respect to factors that support walking, sojourn in public space and pedestrian safety and health?

K	What factors determine trends in pedestrian quality?	
	K.1	Demographic factors
	K.2	Social and Cultural factors
	K.3	Economic factors
	K.4	Health factors
	K.5	Political factors
	K.6	Interrelations between above factors
	K.7	Factors related to physical environment and transport characteristics

L	What measures, interventions, policies and strategies can help improve the pedestrians' situation on the longer term (2030)?	
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M	What integral policy programs need to be recommended in relation to their changing context?	
	M.1.	How durable are the recommended measures, materials and policies?
	M.2	What should be the role of legislation in maintaining and updating quality?

N	How durable are the used definitions and concepts? Why do they grow or change in time?	
	N.1	Which of the definitions and concepts have changed over time?
	N.2	What factors cause a definition change?
	N.3	What changes can be expected?

O	How durable are the identified and recommended measures and materials?	
	N.1	What are the failure types with regard to durability of materials, measures, policies, strategies?
	N.2	What makes a material robust, durable, sustainable?
	N.3	What makes a measure robust, durable, sustainable?
	N.4	What makes a policy robust, durable, sustainable (success factors)?

Working Group 4 Research Questions

A	Overview of the state of affairs	
	A.1	What are the common and distinguishing features in the Country Reports?
	A.2	What data are used? Are the data comparable?
	A.3	How can the situations in the participating countries be valued? What conclusions can be drawn with respect to the position of the pedestrian and the effectiveness of policy procedures for pedestrian quality?
	A.4	What additional questions need to be asked?

B	Progress with regard to the scientific programme	
	B.1	Development and improvement of the PQN Conceptual Model
	B.2	Are the general and specific research questions relevant, coherent and covering the research objectives (comprehensive, system approach)? Do they need to be adjusted?
	B.3	Planning and prioritising research
		What research questions are most urgent and what questions can be left for later projects? Are there urgent additional questions?
		Is the expertise available within the PQN participants group or is outside expertise needed?
		Can the question be answered within the allocated time span?
		Updating the research programme
	B.4	Monitoring and methodology quality control
	B.5	Results quality assessment
	B.6

C	Identification of valid, reliable, just and quantifiable indicators for pedestrian quality (how can quality be valued?)	
	C.1	What is pedestrian quality? What aspects can be distinguished? How can quality be assessed and valued? Within what context?
	C.2	What indicators are mentioned in literature? What is their (scientific and societal) value? Do they relate to Universal Design / Design for All / Social inclusion?
	C.3	What data are needed for the indicators? Can they be made available?
	C.4	What can be said about the (political) acceptability of the found indicators?
	C.5	How do the indicators interrelate? Are there compensating mechanisms?
		C.5.1 What interrelations are there?
		C.5.2 To what extent are walking, mobility, health interrelated?
		C.5.3 What is the importance of environment and transport-related physical activity seen in the light of pedestrian quality
		C.5.4 What lessons can be learned with regard to inter-sector partnership & cooperation?
	C.6	What data on walking and the use of public space are needed? Why?
		C.6.1 Minimum requirements, optimal situation,, depending on country situation?
		C.6.2 Levels of quality?

D	Identification of changeable, constant and irreversible factors influencing pedestrian quality	
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	D.1	What factors can be influenced by which stakeholder (stakeholder responsibility)?
	D.2	Which 'external' or autonomous factors are there (out of range on any stakeholders influence)?
	D.3	Which relevant factors can be influenced? To what extent? How much energy and costs are needed for change? Can cost-effectiveness be made plausible? What factors are hardly changeable and must be side-tracked?
	D.4	How do the factors interrelate?
	D.5	What common of mutual interest are there?

E	Identification of compensatory mechanisms	
	E.1	How do pedestrian qualities interrelate with other qualities (positive of negative)?
	E.2	What self enhancing factors and what self reducing factors are there?

F	Identification of models, concepts and theories that can help advance effectiveness and efficiency of the systems approach regarding pedestrian quality improvement	
	F.1	What concepts, models and theories are there in literature? Which ones are developed and used in one or more of the 3 work packages?
	F.2	What are the characteristics, limits of operation, pro's and cons of (design) concepts, models, theories and notions that were come across in the work packages?
	F.3	What is known about their effectiveness and efficiency?
	F.4	Can the concepts, models, theories and results be integrated?
	F.5	How and to what extent can design concepts and notions be improved?
	F.6	What prejudices and 'false' theories can be detected? How can they be mitigated?

G	Identification of a (design) theory for integrating the functional, perception and durability and future progress perspectives into one persuading paradigm (How can the results of the 3 work packages be integrated?)	
	G.1	What makes a paradigm (politically) persuading? Within what context?
	G.2	What integration (design) theories are there? Which ones can help integrating the 3 perspectives into one comprehensive paradigm?

H	An overview of the State of the Art and relevant innovations, including the ones developed in the PQN project	
	H.1	What is needed to improve pedestrian quality in suburban and peri-urban situations? What can be the role of city and land use planning? What other policy measures are needed?
	H.1.1	What best practises and experiences are useful or appropriate? What improvements are needed?
	H.1.2	Which design issues need (more) attention?
	H.1.3	Which interventions are needed to prevent degradation of pedestrian quality of life or to ensure safe mobility?
	H.1.4	Which is the most important set of requirements, defined together in a system of pedestrian qualities and facilities?
	H.2	What is the influence of pedestrian quality, design and use, on social inclusion/exclusion, co-existence and separation? To what extent is Design for All feasible? What are the consequences of 'counter' concepts like 'shared space'?
	H.3	What kinds of (active) policies and policy approaches are there on the various governmental levels? What is known about their effectiveness and efficiency?

	H.4	What kinds of policies stand out (State of the Art policy programs)
	H.5	Partnership - best practises

I	Practical audit instruments	
	I.1	What elements need to be included in practical pedestrian quality audit instruments? What should be included in the terms of reference (programme of requirements)?
	I.2	What audit instruments are already available? How good are they with respect to the terms of reference?

J	Recommendations for Making It Happen	
	J.1	What different methods will be needed for different cultures and target groups?
	J.2	What strategies and tools are needed for this?
	J.3	What barriers are there for policy making and implementation?
	J.3.1	What barriers are there on the local authority level? How can that be mitigated?
	J.3.2	What barriers are there on the regional and national levels? How can that be mitigated?
	J.3.3	What barriers are there on the European level? How can that be mitigated?
	J.3.4	What barriers are there with respect to improvements facility providers (design, management, maintenance)? How can that be mitigated?
	J.3.5	What barriers are there with respect to helpful media coverage? How can that be mitigated?
	J.4	What instruments and tools are lacking; what instruments and tools need to be developed?
	J.4.1	Research tools
	J.4.2	Tools for policy making
	J.4.3	Auditing tools
	J.4.4	Implementation tools
	J.4.5	Communication Tools
	J.4.6.	Knowledge management

K	Identification of optimal dissemination strategies and methods; Agenda for Action	
	K.1	What are, in relation to the content, the most adequate methods to disseminate the project results? What strategies and tools are needed for this?

L	Recommendations for further research	
	L.1	What are the gaps in knowledge?
	L.1.1	pedestrian behaviour
	L.1.2	the pedestrians social environments (including social norms and values, legislation requirements)
	L.1.3	The pedestrians' physical environment (site, network, land use)
	L.1.4	Relation to / accessibility of transportation system
	L.1.5	Interaction between elements
	L.1.6	Data
	L.1.7	Policy options
	L.1.8



Appendix 4 Activities per stage (planned in 2006)

Stage 1. Setup of conceptual and organisational structure

(ready November 2007)

For practical reasons this work has started some months before the formal plenary Kick-off meeting of the project on 13 and 14 November 2006.

The first activity was to develop a dedicated common conceptual model. A draft of the model is pictured in figure 1 (page 11) of the Work Plan presented at the Kick-Off meeting. The model is designed to be used as a means for deducing relevant specific research questions. In its Appendix 1 an initial impetus to specific research questions, based on the conceptual model, was described.

Secondly a draft Country Reports Questionnaire is developed and first tested in the Netherlands. The draft questionnaire is included in Appendix 5.

At the Kick-off meeting working group members are asked to share information on current relevant research projects. Next they are asked to commit to attending to the questions relating to their individual expertise, focussing on the R&D findings in their own countries and to contribute by sharing results of relevant national research projects.

At the Kick-off meeting the foundation for the research and division of tasks will be discussed and decided on. The meeting should result in agreement on at least:

- the content and role of the conceptual model
- the general research questions
- general working methods and procedures
- the Country Reports Questionnaire.

Concrete activities:

- Development and finalisation of the PQN Conceptual Model
- Deduction of relevant research questions
- Development of a Country Report questionnaire
- Setting up the project organisation and management structure
- Drafting an integral project Work Plan
- Sharing of information on relevant national projects
- Division of research tasks
- Setting up Quality Control

Stage 2. Data/info accumulation

(November 2007 – September 2007)

In Stage 2 involves collecting both available generic information and national-specific data and information with regard to the agreed research questions at the Kick-off meeting.

A first step will be an overall internet and literature scan (Quick Scan). The individual findings will be documented and summarised in English. Per question the results will be summarised. Relevant summaries will be distributed to the other working groups.

Where possible National PQN research committees were formed to do research within the framework of the project, and to do research on pedestrian issues for national purposes. This

sometimes included acquiring additional funding and recruiting of researchers and students for (basic) research activities within the context of the PQN scientific programme.

As mentioned before, for the compilation a Country Reports questionnaire was developed (see Appendix 5 of the Work Plan). A country report will summarise national facts and figures, policy statements, developments, research activities etc. and possibly accounts of interviews of national experts and stakeholders and media accounts.

Adequate empirical data on pedestrian needs and activity are badly needed. Therefore efforts were made to gather at least basic mobility data, data on time spent in public space, accident and/or hospital admittance (ER) data.

A dedicated website was developed and managed. There was a public part for general project information and approved results and a shielded section, where the participant's intermediary result could be posted.

The summaries of research findings and preliminary results of empirical studies will be discussed at the Working Group meetings, connected to the half-yearly COST 358 Management Committee meetings. At these workshops the results so far will be evaluated (to which extent are the research questions answered?) will gaps in knowledge be identified and additional research planned.

Concrete activities:

- Formation of national research committees and recruiting researchers and students for (additional) studies
- Acquiring additional funding for dedicated research projects within the context of the PQN scientific programme
- Document available information with regard to agreed general and specific research questions (what is known from earlier publications? = Quick Scan)
- Development of a Communication Plan
- Compilation of Country Reports on the current situation
- Comparison of countries with regard to the position and needs of the pedestrians, its context and lessons to be learned
- If possible basic empirical data will be gathered
- Discussion on research results so far and detection of gaps (in early Spring and in late Summer)
- Planning of additional research
- Exchange of information of intermediary results, plans and progress
- Organisation of Workshops in Spring and Summer 2007
- External communication on project objectives and progress

Products:

- Establishment of some national PQN committees
- PQN website
- PQN Conceptual Model paper
- Literature reviews (summaries of relevant publications in English)
- Overview of current projects on the issue in (at least) the participating countries
- Country reports
- Assessment of similarities and differences of country contexts
- Assessment of gaps in knowledge
- Detailed research plans
- Overview of options and plans for collecting additional data and information
- Provisional reports on sub-projects



- 2007 PQN Progress reports (external)
- Internal Workshops on intermediary results and research planning in Spring 2007 and in late Summer 2007)
- External presentations on progress of the Action (ICTCT, Walk21)

Stage 3. Analysis of available data and additional research

(summer 2007 – September 2008)

In stage 3 the available data will be analysed more thoroughly. Special attention will be given to theories and models that explain mechanisms with regard to pedestrian needs, including SWOT⁷³-analysis of interventions and policy implementation programs, actor analysis and identification of key players. The activities are aimed both at identification of promising strategies and best practises and of common misunderstandings, myths and sagas that impede improvement.

Based on the above insights new analysing, development, implementation and communication tools will be developed and assessed.

During the process much attention will be given to quality control and internal communication. In this context, concept definitions, the data quality and comparability, used methods, models and theories were presented, discussed and evaluated internally.

In this stage WG1, WG2 and WG3 can conclude their research activities and start concentrate on reporting results. In WG4 however, the focus of the work lies on developing a model for the integration of the research finding with respect to functionality, perception and durability and future prospects into a coherent paradigm and coherent recommendations for policy development and future research.

At the end of this stage articles on (selected) research questions were drafted and discussed in the Working group meetings.

Concrete activities:

- In depth analysis of accumulated data and information
- Execution of additional (empirical) research; updating available statistical data
- SWOT analysis of methods, models and theories used in the project
- SWOT analysis of common working methods and practises, models, theories and the identification of best practises
- Actor analysis and identification of key players and their sensitivities and practical mobilisation strategies
- Differentiation in 'market segments'
- Development of new tools for research, communication and implementation
- Compilation of interim / first draft WG reports
- Development of a model for integration of the 3 research perspectives
- (Fraternal) review of intermediary products
- Organisation of Working Group meetings
- External communication on progress of the Action

Products:

- Description and evaluation of methods used in the project
- Interim reports on research findings
- Interim reports on common working methods, models, theories

⁷³ SWOT = Strengths, Weaknesses, Opportunities, Threats

- Interim reports on stakeholders' improvement options and policies
- An (annotated) outline of the Handbook
- Monthly WG progress reports (internal)
- 2008 PQN Progress reports (external)
- Internal 2008 Workshop
- External presentations on progress of the Action (ICTCT, Walk21).

Stage 4. Reporting on findings

(September 2008 – June 2009)

In Stage 4 the findings of the Working Groups were described and summarised in WG reports. The found knowledge was used for developing practical instruments and tools for auditing and improving pedestrian quality.

At the end of this stage Working Group meetings were organised. During these meetings the draft articles on research findings were discussed and evaluated.

Concrete activities:

- Drafting of articles for Working Group reports.

Products:

- Conceptual Model report
- Draft articles for the WG reports
- 2009 PQN Progress reports (external)
- Presentations of individual project results at various conferences and congresses
- Articles in (scientific) periodicals
- External presentations on progress of the Action (ICTCT, Walk21)

Stage 5. Dissemination of findings

(June 2009 – October 2010)

In Stage 5 the activities are focussed on finalising the project and dissemination of the results. The project will be concluded by a Final Conference. Reactions this conference will be dealt with by the experts; follow up activities will be planned and organised on the national level.

Concrete activities:

- Finalising and production of the Final Report
- Discussion and development of follow-up activities
- Organisation of International Conference in November 2010
- Setting up national follow-up activities, such as translation of project products, acquiring funding for national dissemination activities and recruiting instructors.

Products:

- Final Report in 3 parts
- Final conference



Appendix 5 WG 1, 2, 3 key Research Question < > WG 4 Tasks

The key questions with regard to the WG 1 work package are:

Relations WG1 – WG4		
	WG 1 Key research question	WG 4 Task
A	What is known about presence, mobility and safety characteristics of pedestrians in public space	1, 10
B	To what extent do initial choices regarding residence, work place, recreation and social relations influence walking options?	1, 4, 10
C	What 'objective' factors and mechanisms determine the pedestrians' travel and/or sojourn motives?	1, 2, 4, 10
D	Which physical and safety needs do they relate to?	1, 2, 10
E	What 'objective' factors and mechanisms determine the pedestrians' routing and sojourn decisions and safety precautions taken?	1, 2, 4, 10
F	What tasks are pedestrians to perform?	1, 10
G	To which extent are individuals able to perform these tasks and what groups can be distinguished?	1, 2, 4, 10
H	Which facilities and provisions are (implicitly) required for performing the tasks adequately?	3, 10
I	What are the risks?	5, 10
J	What are the (basic) risk factors and what are favourable factors?	3, 4, 10
K	What factors determine pedestrian quality from a functionality perspective?	4, 5, 6, 10
L	What measures, interventions, policies and strategies can improve the pedestrians' situation?	4, 6, 7, 9, 10
M	What integral policy programs need to be recommended in relation to their context?	6, 7, 8, 9, 10

Relations WG2 – WG4		
	WG 2 Key research question	WG 4 Task
A	What is the perception of presence, mobility and safety in public space?	1, 2, 10
B	To what extent do initial choices regarding residence, work place, recreation and social relations influence perceived walking options?	1, 2, 10
C	What 'subjective' factors and psychological mechanisms determine the pedestrians' travel and/or sojourn motives?	1, 2, 10
D	What 'subjective' factors and mechanisms determine the pedestrians' routing and sojourn decisions and safety precautions taken?	1, 2, 10
E	What tasks are pedestrians perceived to perform?	1, 10
F	To which extent are individuals perceived to be able to perform these tasks and what groups can be distinguished?	1, 2, 4, 10
G	Which facilities and provisions are perceived to be required for performing the tasks adequately?	3, 10
H	What are the perceived risks?	5, 10
I	What are the perceived risk factors and what are perceived favourable factors?	6, 10
J	What factors determine pedestrian quality from a perception perspective?	5, 6, 10
K	What measures, interventions, policies and strategies are perceived to improve the pedestrians' situation? What measure can people believe in?	6, 7, 8, 9, 10
L	What integral policy programs need to be recommended in relation to their context?	6, 7, 8, 9, 10

Relations WG3 – WG4		
	WG 2 Key research question	WG 4 Task
A	Trends – forecasts, scenarios & their impact on walking	1, 2, 10
B	Visions – requirements, needs, demands	3, 4, 8, 10
C	Interventions	5, 6, 7, 8, 9, 10
D	Durability	5, 7, 8, 10

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Appendix 7 The European Charter of Pedestrians' Rights **(adopted in 1988 by The European Parliament)**

I. The pedestrian has the right to live in a healthy environment and freely to enjoy the amenities offered by public areas under conditions that adequately safeguard his physical and psychological well-being.

II. The pedestrian has the right to live in urban or village centres tailored to the needs of human beings and not to the needs of the motor car and to have amenities within walking or cycling distance.

III. Children, the elderly and the disabled have the right to expect towns to be places of easy social contact and not places that aggravate their inherent weakness.

IV. The disabled have the right to specify measures to maximise mobility, such as the elimination of architectural obstacles and the adequate equipping of public means of transport.

V. The pedestrian has the right to urban areas which are intended exclusively for his use, are as extensive as possible and are not mere 'pedestrian precincts' but in harmony with the overall organisation of the town.

VI. The pedestrian has a particular right to expect;

a) compliance with chemical and noise emission standards for motor vehicles which scientists consider to be tolerable,

b) the introduction into all public transport systems of vehicles that are not a source of either air or noise pollution,

c) the creation of 'green lungs', including the planting of trees in urban areas,

d) the control of speed limits by modifying the layout of roads and junctions (e.g. by incorporating safety islands etc.), so that motorists adjust their speed, as a way of effectively safeguarding pedestrian and bicycle traffic,

e) the banning of advertising which encourages an improper and dangerous use of the motor car,

f) an effective system of road signs whose design also takes into account the needs of the blind and the deaf,

g) the adoption of specific measures to ensure that vehicular and pedestrian traffic has ease of access to, and freedom of movement and the possibility of stopping on, roads and pavements respectively (for example: anti-slip pavement surfaces, ramps at kerbs to compensate for the difference in the levels of pavement and roadway, roads made wide enough for the traffic they have to carry, special arrangements while building work is in progress, adaptation of the urban street infrastructure to protect motor car traffic, provision of parking and rest areas and subways and footbridges),

h) the introduction of the system of risk liability so that the person creating the risk bears the financial consequences thereof (as has been the case in France, for example, since 1985).

VII. The pedestrian has the right to complete and unimpeded mobility, which can be achieved through the integrated use of the means of transport. In particular, he has the right to expect;

a) an extensive and well-equipped public transport service which will meet the needs of all citizens, from the physically fit to the disabled,

b) the provision of bicycle lanes throughout the urban areas,

c) the creation of parking lots which affect neither the mobility of pedestrians nor their ability to enjoy areas of architectural distinction.

VIII. Each Member State must ensure that comprehensive information on the rights of pedestrians is disseminated through the most appropriate channels and is made available to children from the beginning of their school career.



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