COST 358 Pedestrians’ Quality Needs

Policy Process

PQN Final Report - Part B5: Documentation
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Pedestrians' Quality Needs

Policy process

PQN Final Report - Part B5 Documentation

PQN project - Working Group 4 Coherence and Integration

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Summary of Working Group 4 Coherence and Integration

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‘…Take people as they are. There are no others ....’  
advertisement by Dutch Government on ‘respect’

1. Introduction

The main reason for starting the COST 358 Pedestrian’s Quality Needs project was the observation that current policy does not properly support walking and sojourning in public space and the idea that we can do better than that. It was assumed that a comprehensive system approach to the issue, similar to state of the art strategies like ‘Sustainable Road Safety’ (Wegman et al, 2005) and the ecological approach to health (Sallis et al, 2006), would offer a better alternative. Furthermore, it was assumed that the best way to improve the pedestrian’s situation, is to start with the needs of the pedestrian, deal with the issue separately and see what is best from that perspective. Riding along with supportive policy strategies with regard to the environment, health, road safety etc., and integration of the support of walking and sojourning in other policies from the start, have been seen to produce sub-optimal results for the pedestrian. The PQN COST Action explored these ideas.

The aim of comprehensiveness entails that the issue is examined from all relevant perspectives:
- What can be measured (Working group 1 Functional Needs)
- What stakeholders’ opinions and intentions are (Working Group 2 Perceived Needs)
- How quality evolves over time (Working Group 3 Durability and Future Prospects)
- Integration of the 3 perspective into practical comprehensive policies (Working Group 4 Coherence and Integration).

Initially the idea was that the main responsibility of Working Group 4 was to focus on the interrelationships between the first three working groups and the integration of the research results in a handbook, which would comprehensively cover a systems approach to the pedestrian issue. Furthermore the Working Group should develop policy and future research recommendations.

Soon after the start of the project the Working Group became aware that insights and results for the other groups would not be available until very late in the project. In fact most of the results became available at the very end of the project and it proved that there was hardly any time left to perform the integration task. It was possible however, to devote time to the review of the conceptual framework for a systems approach to the pedestrian issue, to contribute papers on the systems approach as documentation within Part B of the PQN Final Report, and to help to write and edit Part C Executive summary.
2. The Conceptual Framework

The Conceptual Framework is described in a separate volume of the PQN Final Report. For understanding the structure of the Working Group 4 reports however, it is necessary to summarise the main features of the PQN Conceptual Framework.

A first postulate is that a PQN Systems Approach is not so much about solving problems, but more about improving the quality of the pedestrians’ environment, thus implicitly dealing with current and foreseeable future problems.

A Systems Approach not only covers the content of the issue, but also the change process towards improvement and the nesting of the interventions and processes in a wider context. A systematic process design is taken as frame for the assignment of individual participant’s tasks within Working Group 4. In each process step the content should cover all relevant elements within the pedestrians’ system. At the end of the process the impact on the ‘outside world’ of promising interventions, measures and programs is evaluated; at that stage fine-tuning can take place to improve feasibility, effectiveness and efficiency of proposed changes. The steps (and task assignments of the Working Group 4 members) are displayed in Figure 1.

Figure 1 (Sub-)steps in the pedestrian quality policy process
The pedestrians’ system is seen as a stratified system. At the most abstract level it features 4 elements: the environment, the pedestrians’ system, input (=intervention) and output. On the next level it also features 4 elements, namely the pedestrian, the social environment, the physical environment, transportation and their interrelations. On the concrete level quality determinants in relation are pictured. The pedestrian’s behaviour and his performance are determined by needs, opportunities and abilities.

The benefits of the PQN Systems Approach are believed to be:
- In principle it covers all options
- It will offer best value for money
- If properly done, it will improve the field’s image.

3. Policy Process Development

3.1. Identification of Needs

Discussions within Working Group 4 led to three papers relating to the identification of needs. It was found necessary to work out conceptual analysis of needs. The paper ‘Identification of Pedestrian Quality Needs – A Conceptual, Systems-theoretic, and Pragmatic Analysis’ by Kimmo Lapintie reflects this analysis. It pictures an analytical construction of the concept of needs, based on conceptual analysis of literature in various research fields. The various needs of pedestrians that Lapintie distinguishes are summarised in Table 1 Classification of needs. The paper does not specify what the concrete quality needs of pedestrians are.

Table 1 Classification of needs (Lapintie, 2008)

<table>
<thead>
<tr>
<th>Type of need</th>
<th>Definition</th>
<th>Relevance and problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeostatic/subsistence needs</td>
<td>Necessity of the human physical system to maintain a set level of temperature, nutrition, activity, etc.)</td>
<td>Provision of shade, shelter, resting places, public wells, restaurants and cafeterias, safe crossings, etc.</td>
</tr>
<tr>
<td>Psychological needs</td>
<td>Necessity to reach e.g. relatedness, competence and autonomy in order to live a satisfying and meaningful life</td>
<td>Provision of accessible public and community spaces for meeting and communication, clear orientation and legibility, necessary control to ensure personal security.</td>
</tr>
<tr>
<td>Aesthetic needs</td>
<td>Preference for well-designed and/or meaningful cultural products and natural environments, can be refined through education and acquaintance with the arts</td>
<td>Provision of well-designed urban space, good materials and street furniture, scenic environments.</td>
</tr>
<tr>
<td>Social needs</td>
<td>Necessity of social groups to communicate and cooperate, as well as form social distinctions.</td>
<td>Provision of accessible public spaces for meeting and communication, clear orientation and legibility.</td>
</tr>
<tr>
<td>Public/political needs</td>
<td>Facilities and services that are considered citizens' rights that the political system is committed to. Disciplinary control/subjugation.</td>
<td>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.</td>
</tr>
</tbody>
</table>

Source: Kimmo Lapintie: The interdisciplinary Concept of Need (note for WG4 10-11-2008)
Ralf Risser and Christine Chaloupka took a different perspective. They summarised basic theories and definitions of needs from a psychological perspective as well as empirical studies on the issue. Their paper starts with definitions of needs. A major issue is that a need concerns something that is necessary for survival, whereas a want is simply something that a person would like to have.

Literature offers many theories on needs. One of the best known ones is from Maslow on the hierarchy of needs. Other important contributions to theory were Alderfer, Gasiet, Graves, Hofstede, Early and McClelland. Currently there is (some) consensus that needs are not so much structured in a hierarchical way, but that they interact. Needs relate to values, as values are assumptions and feelings of what is desirable. Sometimes specific needs will conflict with other needs, and this is often the case with individual and life-quality needs (collective needs). Following Hakamies-Blomqvist (WALCYNG project) Risser & Chaloupka distinguish eight types of needs. For each of them they provide indicators. The eight types of needs are:

1. The social values and motives (contracts, relationships, transactions)
2. Health aspects, the provided comfort ('easy to walk')
3. Comfort
4. Weather protection (against rain, sun, snow, wind)
5. Safety preconditions (reflecting most of all feelings of safety)
6. Mobility (meaning the given possibilities to be mobile spontaneously)
7. Aesthetics
8. Interoperability / usability.

Lapintie’s conceptualization and Risser & Chaloupka’s practical indicators served as input for the third source paper, by Rob Methorst, on the Identification of quality needs. Methorst argues that a logical way to support walking and sojourning in public space is to start with the identification of the pedestrian’s needs and abilities. The main aim of the identification of pedestrian needs and abilities is to provide a valid, suitable and convincing ground for stipulating requirements for pedestrian facilities.

Basic pedestrian characteristics and abilities set the stage for pedestrian quality needs:

- Heterogeneity: almost everyone is or can be a pedestrian; individual needs and abilities to satisfy them vary from person to person
- The dimensions of a pedestrian: takes approximately 0,5 square meters of space, much less than other modes
- The walking average and maximum speed is slower than (almost) all other modes
- The action radius of a pedestrian: less than other modes; depend on personal abilities
- A pedestrian not only walks, but also sojourns in public space
- A pedestrian is relatively vulnerable; they are not protected by a vehicle’s structure.

A guiding principle for the identification of needs and stipulating requirements is Design for All, which postulates that it is most opportune to start from the needs of persons that do not have a choice but to walk and the persons that have most difficulties walking and sojourning.

The same basic needs can have different appearances on the four optional pedestrian activity levels: lifestyle, strategic, tactical and operational activity levels. At the lifestyle activity level preconditions for walking and sojourning are defined. Information, proximity of relevant destinations, to feel at home, independence, social activities, free use of public space and equity are the dominant pedestrian needs. The conditions must be Convivial, Convenient, Connected, Conspicuous and Comfortable (the 5 C’s).
On the strategic activity the same fundamental needs apply, but they are more concretely felt at temporary conditions and related to timely availability of opportunities. There is a difference in experienced needs between daily trips and new and incidental trips to unfamiliar grounds. For the latter certainty about conditions under way is a most relevant need. Aesthetics play a role in on-the-spot choices.

3.2. Identification of requirements

The policy development step of Identification of requirements is substantiated by Jürgen Gerlach through his prolusion of a requirements checklist, as a practical tool for policy development, focussed on walkability and PQN inspections. The tool consists of detailed questions on features that support walking and sojourning in public space. It is meant as a first draft of requirements guidelines and recommendations regarding pedestrian issue policy development, the physical environment, transportation and services to support walking and sojourning in public space. As there still is very little ‘mature’ information about non-infrastructural aspects and strategic policies and services for pedestrians, walking and sojourning, these issues need to be substantiated in future projects.

Insight in the pedestrians’ needs and abilities is the key to successful improvement of the system. No knowledge and insight 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 adequate support of walking and sojourning is to have adequate system knowledge and issue awareness at the policy development and decision making levels. This means that data availability, research and development are critical requirements. Education of key players in the field is essential. Other critical preconditions are willingness to support walking and sojourning, 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 lifestyles 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. Requirements of this order set the stage for visible, tangible and concrete facilities and services for walking and sojourning and relate to tactical level facilities and services, like network characteristics, traffic rules and enforcement, vehicle regulation and traffic management. These criteria describe the traffic flow. Examples of this order of requirements are: public transport (relevance and schedule), speed limits, traffic lights, etc.

When there is a functional structure for concrete facilities in place, it becomes opportune to define requirements regarding visible, tangible, concrete facilities and services for walking and sojourning. This order of requirement concerns the equipment of pedestrians, contact options of the social environment, design and equipment of public space and the availability, design and equipment of the transportation system. Here requirement specifications concern pedestrians, vehicles, the physical environments and elementary operational behaviour of other people (including other road users) in the environment as well as concrete opportunities for pedestrians to perform intended activities. Examples of this order of requirements are: speed limiting measures, pedestrian crossings, conditions of surface, other designs of roadside elements and also the equipment of roadside elements.

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 (Methorst, 2000).

![Cascade of interventions principle (after Methorst, 2000)](image)

### 3.3. Picturing the expedient system

Obviously, a list of requirements with regard to specific items does not suffice as a reference framework for policy developments and proper evaluation of interventions for the support of walking and sojourning. Some requirements are more important than others; some of the specified requirements may conflict with more general ones and vice versa. Requirements point to desirable qualities of the pedestrian’s environment or pedestrian competences and abilities. Such qualities relate to usage, specific situations, cultural contexts etc. In the 5th contribution (section B5.7.), by Hector Monterde and Diego Moreno (titled ‘Assessing the importance of qualities’), ideas on ranking qualities are presented and discussed: ‘to what extent do qualities of the pedestrian system reinforce the objective and subjective preconditions to fulfil the pedestrian needs?’. Monterde and Moreno find that there are a number of relevant perspectives regarding rating of importance of qualities. As such they identify:

- **the Bradshaw typology**
  Bradshaw distinguishes 4 categories of needs: ‘normative needs’, that are defined by professionals, ‘felt needs’ that are equated to what people want, ‘expressed needs’ that are generally seen as ‘demand’ or ‘un-met need’, and ‘comparative needs’ that are measured by reference to facilities and services that are in available elsewhere. The categories cover different grounds and have their own limitations. Rating according to this typology can lead to qualifications like ‘real need’, ‘no need at all' and ‘inconclusive’.

- **the hierarchy of Walking Needs** (Alfonzo, Hagen, Maslow)
  In this type of rating some kind of hierarchy is distinguished, whereas some qualities are more fundamental than others. The most basic quality is mobility or feasibility. Pleasurability or attractiveness are the least important qualities. In between come accessibility, safety and security, reliability, comfort and convenience.

- **Demand on the physical environment** (Gehl)
  With regard to outdoor activities Gehl distinguishes ‘necessary activities’, that will be performed whenever possible, ‘optional activities' that depend on what a place has to offer.
or how people behave and feel about it and ‘social activities’, that will only take place when there are other people in the environment.

- **Multiple Categorization Concepts**
  
  This type of rating procedure can take advantage of several rating concepts by combining them and putting them in a matrix. What the matrix will look like will depend on the input received.

Within the context of the project it was not yet feasible to provide functional and consistent guidance for the development of dedicated Reference Visions.

### 3.4. Evaluation of the current state of the system

The third frame of the policy development process concerns the Evaluation of the Actual State of the System. Within Working Group 4 this issue was broken up in two parts. The first part deals with how well the pedestrian’s environment and the conditions and opportunities that are actually offered, comply with the quality requirements as they are identified in the vision, in guidelines, legislation, policy statements etc. This part is discussed in section B.5.8, by Nicole Muhlrad, titled ‘Evaluation of the current system’. As this activity relies heavily on the maturity and consistency of the available material on requirements and even more the availability of information on the current situation with regard to the specified requirements, and such information is quite scarce, the paper can offer only expert opinions and suggestions that cannot yet be based on firm scientific evidence.

At the national level the position of the pedestrian is defined by knowledge and knowledge management, media attention and policy frameworks that affect walking and sojourning. Legislation and formal policy statements in policy papers as well as the means available on the national and local levels (including the organisational structure, education of professionals, road user education and training, and promotional activities) set the scene for the improvements.

A large variety of stakeholders are involved in policies with an impact on the pedestrians' urban environment, at the European, national, regional and local levels. Such policies range from urban and land use planning to detailed road and street design through transport and traffic management, traffic safety, health promotion, reduction of CO2 emissions or even regulatory policies on the prevention of terrorism and violence. Policies are rarely coordinated with regards to their impact on walking and on walking conditions although some of their components do interact. With such a complex decision-making system, analysing how current pedestrians' environments satisfy pedestrian quality needs requires a systems approach covering all relevant policy components.

Because of the number of stakeholders involved and the complexity of their relationships, there has been so far no system-based assessment of the quality of the pedestrians' environments. However, analysing the current situation at the European, national or local level is needed to raise awareness of the need for progress in the public and in the relevant groups of policy-makers, as well as to identify the priority problems to be treated. In order to facilitate the analysis, guidelines are proposed to check the level of satisfaction of pedestrian quality needs of policy-components and of the physical urban environment. Any of the stakeholders involved may take up the task and it is hoped that the methodological tools provided will encourage and help them. It is therefore suggested to develop a national observation system (NOS) of local practise on Pedestrian Quality Needs, to benchmark local authorities and promote effective strategies for improvements.

On the local level activities regarding walking and sojourning are focussed on concrete measures; policy statements and plans, organisational structure and means available, and
the structural heritage regarding walking and sojourning, however, determine the quantity and quality of walking and sojourning. It is important that a local Urban Monitoring System (UMS) is established, to identify deficits in the local system for walking and sojourning and to make them visible.

The description of the policy elements to examine the current state of the pedestrians’ environment underlines the complexity of the systems at the national and the local levels and the multiple nature of the analysis. None of the stakeholders who may be interested in performing the analysis can be expected to master the whole picture, or even to want to consider all of it. In practice, they may choose to analyse only the elements which are more directly linked to the system they are responsible for or on which they are working. In order to get a complete state-of-the-art and to build NOSs or UMSs, the contribution of a number of different stakeholders will thus be required.

The analysis which has been suggested is neither an assessment nor an evaluation of the pedestrians’ environment with regards to Pedestrian Quality Needs. To evaluate, one would have to use a priority ranking of needs, leading to a ranking of requirements and develop an indicator or indicators of achievement in terms of satisfaction of PQNs. To this purpose, further research is required.

The method of analysis as proposed here is nevertheless a useful tool to progress on issues of importance for walking: its application should pinpoint the areas or policy items where the situation is unsatisfactory or where too little is known of the items of concern for pedestrians. This will be where useful action can be taken.

3.5. Evaluation of performance and satisfaction

The second part of the third policy development process frame concerns the evaluation of how pedestrians actually function, and how satisfied they are with what their environment offers. Section B.5.9. Evaluation of the pedestrians’ performance and satisfaction, by Rob Methorst, also suffers from limited information and data. By using multiple data sources and fine-tuned definitions, a picture of the real order of magnitude of performance indicators can be calculated. Thus basic real-numbers figures regarding handicaps, mobility, importance of sojourning, risks and pedestrian satisfaction are presented.

Methorst finds that performance of pedestrians with regard to their major objectives does not appear directly from available statistics. For a comprehensive and true picture of the pedestrians’ functioning and satisfaction hidden issues must be uncovered. Available figures must be corrected for bias by complementary estimations. Reality must be evaluated from all relevant perspectives: functionality, perception, durability and future prospects and coherence and integration.

Pedestrians are an extremely heterogeneous group. The functioning of the system depends particularly on how well low competency persons can function. The order of magnitude of mobility restrictions can be estimated through much used indicators from the SF12 surveys and OECD indicators for Quality of Life studies. Additional indicators can be derived from travel surveys and health statistics on disorders. About 50% of the pedestrians have limited abilities and about 10% of the population has severe difficulties walking and sojourning in public space. Because of ageing of society these shares will increase substantially (in 2030 probably more than 12% of the EU population will have severe mobility handicaps).

Mobility is defined by the freedom to choose to travel and sojourn in public space. The amount of distance that one can cover is less important than being able to make a trip. Pedestrian mobility differs from other modes by that it is part of almost all other trips. Multi-
modal walking is (almost) as extensive as walking from door to door, but this is hidden in statistics. The hidden amount of walking can be estimated within reasonable margins. Based on available statistics an image of major characteristics of walking can be formed. Action radius, age, urbanity and opportunities seem to be the most significant factors. The normal action radius of a pedestrian is ± 1 kilometre; an average (European) citizen walks 250 door-to-door trips per year and 1,800 times to and from other modes. In total pedestrians cover ± 300 kilometres and spend about 100 hours per person per year on walking.

Sojourning in public space is important because it is an indicator for quality of public space and it encourages all kinds of activities, which humans need for their well-being. There are many kinds of sojourning: professional activities, recreational activities, waiting, hanging out, but public space is also the home of the homeless and sometimes the scene of crime and violence. The concept of sojourning is rather unknown in the Anglo Saxon countries, but this article aims to help to change that. The average amount of time spent on sojourning is about 300 hours per person per year.

Safety and security concern the absence of risk, accidents and potentially harmful incidents. Safety includes security; security is seen as a condition, where one is protected against danger from the outside. As walking is the only mode open to all persons, safety and security must always be seen in the context of mobility and accessibility, particularly protecting the ones that do not have a choice but to walk.

The most used safety indicator is traffic safety accidents. As accidents that do not involve a moving vehicle, are excluded by definition, the data provide a severely biased image of pedestrian safety. Hospital data and medical assistance data show that single pedestrian accidents (falls), where no moving vehicle is involved, induce three to nine time as many casualties as pedestrian-vehicle crashes. Although the risk varies per country and type of accident, the total number of victims for Europe amounts to at least 1.6 million injured pedestrians per year in Europe (equals more than 3,000 casualties per million inhabitants).

As for fatalities, because of the overwhelming external force, pedestrian-vehicle crashes dominate the outcome. The total numbers of pedestrians killed vary from 9 fatalities per million inhabitants in the Netherlands to (more than) 46 in Poland. In the Netherlands the number of vehicle related fatalities per million inhabitants is 6, whilst the number of fatalities from falls is 3.

Concerning severe injuries (casualties admitted to a hospital), for the moment, the only figures available come from the Netherlands. As traffic statistics indicate that the Netherlands is the safest country, the figures for other countries will probably be (much) higher. It is found that the total incidence of pedestrian injuries is 320 per million inhabitants (over 175,000 severely injured Europeans). Of this, 250 per million casualties result from falls (135,000 Europeans) and 75 per million from pedestrian-vehicle collisions (27,000 Europeans). The elderly run extreme risk.

For security the number of incidents is less normative than the fear and emotions it evokes. Compared to traffic accidents and falls, the actual risk on getting injured or killed in a criminal incident is substantially lower. Fear is a reality that needs to be taken into account, because it takes away people's freedom of mobility. Particularly during dusk and night time, especially females and the elderly fear to be involved in a harmful incident. Statistics show that the real number of criminal acts in public space is stable over the years.

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. There is little research carried out on pedestrian satisfaction. The sparse information about what dissatisfies people comes mainly from complaints that local authorities and NGO's received via hotlines, questionnaires or...
internet sites. It is striking that the aspects people communicate are mainly about operational nuisances and that hardly anyone mentions inadequate tactical or strategic level deficits, like network deficiencies, dysfunctional distribution of services etc.

With regard to walking and sojourning, demonstrable serious problems and deficits are partly or totally hidden from public, scientific and political attention. Major issues for policy making with regard to the pedestrian performance and satisfaction are:

- Large numbers of people have real trouble performing ‘walking and sojourning’ tasks. Because of ageing of the population the numbers will increase substantially.
- With regard to safety of pedestrians, particularly the prevention of falls is important; this is also an ageing related problem.
- There is too little awareness that without walking, transportation is not possible.
- The vicious circle of no data – no awareness – no priority - no research – no data, needs to be broken. The lack of data and information on walking and sojourning is imminent; Crucial concepts and statistical units need to be redefined and internationally applied.

3.6. Identification of compliance and satisfaction mechanisms

Risser & Kaufmann’s article (see section B5.10.) deals with the Identification of compliance and satisfaction mechanisms regarding activities of stakeholders to support or improve conditions for walking and sojourning. They argue that, from a psychological point of view, compliance and satisfaction may be seen as belonging together in several ways. People do things only if they make sense to them. Common sense tells us that this refers to the advantages for themselves that are generated by doing certain wished-for things, either in a material or in an idealistic sense. Rewards and sacrifices are dominant determinants for the outcome of decisions on services and measures for the support of walking and sojourning. The paper does not go into the evaluation of chains of events that lead to pedestrians' performance problems. This perspective needs to be dealt with later on.

Without appropriate communication, decisions are taken by decision makers that need cooperation by the public, will not be accepted by relevant groups. What is provided, is subject to individual interpretation. Not only the physical provision of preconditions for walking and sojourning are important, but at the same time how they are perceived. What is provided by public institutions (‘by society’) has to be sold in the sense of marketing. In this context it is important to be aware that there are differences between experts and users in the rating of the importance of indicators for measures to be taken. Risser argues that behaviour steering effects originate from five areas and that these areas are interrelated. The areas are: the individual dispositions, infrastructure, mode, communication and societal issues.

With regard to satisfaction Risser and Kaufman conclude that research indicates that:

- products or services have to meet the addressed persons' (in market research called customers) expectations in order to provide satisfaction
- communication about any product or service can help to highlight relevant features of any service or product and has therefore the potential to enhance the addressed persons' satisfaction
- expectations, what is seen as a reward or as a punishment (sacrifice) in relation to these expectations, and the weight of both rewards and sacrifices when compared to each other’s influence an addressed person's satisfaction

The consequences of the balance between rewarding and punishing elements derived from a certain type of mode use are different, depending on whether one has a choice or not. With regard to walking and sojourning, for persons who have a choice to walk or go by other modes or to sojourn either in public space or in shielded private spaces, they will avoid
walking and sojourning in public space if they perceive rewards as being too small or the sacrifices as being too large. For captive pedestrians the same conditions mean that they will simply have to suffer the consequences. To this group of persons belong senior citizens (the older people get, the more they have to rely on walking), functionally impaired, poor persons (no car, no driving licence) and children and youngsters.

The use of offered facilities and services by pedestrians can be improved by information measures that improve satisfaction. De Lange and Joireman (2007) suggest that attention should be given to:

- the individual's needs and interests (are they met well when one walks?)
- equality issues (is equality provided when compared to other modes?)
- co-operation (is co-operation provided by the authorities, by the social environment, etc.?)
- competition (with whom does one have to compete when walking, how good are the chances to persist?)
- altruism (what is the paradox in altruism, meaning what advantages does it bring to oneself?)

At first sight it appears as that for decision makers there is no direct reward in supporting walking. However, good preconditions seem to be connected to good quality of life, which can be sold to voters and produce rewards. There are considerable risks to be dealt with: supporting walking has the potential to be experienced as disadvantage by car drivers. At the same time society as a whole does not protest if no radical improvements for walking are implemented. It looks as if to implement improvements for walkers depend on intrinsic motivation of politicians and decision makers 'to do the right thing'. Thereby they have the chance to act as avant-garde.

3.7. Identification of promising interventions
At the end of their paper Risser and Kaufmann list types of measures that can be implemented to support walking and sojourning:

- Measures on the individual side
- Measures in connection with communication among road users
- Societal/structural measures
- Infrastructure measures
- Vehicle or mode related measures.

This list of different measures that can be taken in order to improve preconditions for walking and to bring them nearer to the pedestrian quality needs refers mainly to „official persons“, i.e. to those persons who have official responsibility for traffic and transport due to their function, or profession in society. They have duties, in this respect. For others, including researchers, it is a matter of interest whether they invest energy in order to make walking more visible or to enhance the development of better preconditions in connection with their work and/or their lifestyle. They have to be addressed by the „official persons“ in an appropriate way, through all these measures, and certainly a lot of other measures that have not been mentioned here.

Lucia Martincigh’s contribution (see section B5.11.) focuses, from an architectural perspective, on the identification of promising interventions. She delivers a solid account of the process followed to determine promising measures with regard to public space and city infrastructure design, on the project level. She touches on other types of optional solutions too, while interventions on more general levels and larger scale (regional, national) are not
discussed. Still, the experiences, principles and methods can be inspirational for those levels as well.

Martincigh’s essay outlines methods and tools useful to people with different professional expertise who, in their different roles and positions, in the public administration or as consultants, are involved in the improvement of the walking and sojourning conditions of pedestrians in the outdoor public urban spaces.

The determination of the actions to take can start only by the awareness of the presence of specific real problems and of their urgency to be solved. The first part of the essay deals then with possible methods to find out actual problems, of various order, and to prioritise them. It explains then how it is possible to devise solutions apt to face such problems, how the solutions can be evaluated for defining their consistency and appropriateness, and thence their success, both from the scientific and community viewpoint. Finally it describes briefly possible alternative solutions, organized in measures. They constitute different options among which to choose and concern various aspects of the analysed system: the pedestrians themselves, the social environment, the transportation system and the physical environment in which pedestrians travel and sojourn. The propositions are above all at tactical and operational level, but the application of some measures could, in time, influence some choices at the strategical level, for example the choice of transport mode, i.e. walking.

3.8. Assessment of potential pedestrian system output

The last, fifth, frame of the policy development process deals with the decision of interventions and ultimately leads to the implementation of interventions. A crucial step in this frame is the assessment of the pedestrian system output. The major issue here is to find out what the external effects are of proposed interventions for the support of walking and sojourning. Thérèse Steenberghen wrote a contribution on this issue (see section B5.12). Items to be assessed are the pedestrian system output regarding pedestrians needs, the survival, self-healing or correcting power in a wider context, the support offered by the pedestrian system intervention for ‘higher goals’ and lastly the degree to which the operators’ and decision maker goals are endorsed.

Assessment of the overall value of a pedestrian system raises a lot of difficult theoretical issues which are dealt with very differently in various disciplines. The proposed assessment of the pedestrian systems output is inspired by settings from multiple disciplines, thereby combining dimensions with the aim to allow for a more transparent discussion of trade-offs and synergies between impacts and objectives.

The understanding of how the pedestrian system works is inspired by system theory. The pedestrian system is viewed as a dynamic, open, complex and evolutionary system. For the assessment of the pedestrian systems output, a homeopathic approach is proposed; the value is addressed in terms of how well it reinforces the self-correcting, self-healing and survival mechanisms of the social, physical, economical and political environment.

When trying to implement these principles, ethical considerations related to the definition of ‘correcting’, ‘healing’ and ‘survival’ mechanisms cannot be ignored. These are not necessarily directly related to the final outcomes, but to the process through which these final outcomes are reached. To complicate things further, the overall outcomes have to be examined in their distributional effects. To tackle this dimension, a capability approach is tested out. Although there are not many applications at the macro policy level, the method is promising in the way it enables a structured discussion on benefits, distributional issues and ethics.
3.9. Formulation of recommendations for system input plan
Recommendations for the system input plan are included in the PQN Final Report Part C – Executive Summary.

3.10. Identification of Gaps in Knowledge and Best Practises
With regard to Best Practises the main conclusion from the discussion in Working group 4 was that Best Practises should always be seen within their context; because of the complexity and the difficulty of finding good, general examples of good practise, it was decided not to include them in the Final Report.

In a comprehensive project such as PQN 358, it is almost impossible to summarise and describe all gaps in knowledge in the various parts of the project. Almost any topic covered, even those on which a considerable amount of knowledge exists, will have areas which are less well covered and on which additional knowledge would be helpful.

Hakkert attempts to highlight a number of issues which are felt to be critical for the provision of a high quality environment for pedestrians. The chapter touches upon issues related to the lack of appropriate planning models which take into account pedestrian movements, the allocation of space between pedestrians and motorized transport, missing information on infrastructure characteristics and their effects on pedestrian movements.

Related to safety there are major issues to be explored in connection with under-reporting of pedestrian accidents, pedestrian falls not being part of the general police reporting system, issues related to perceived safety.

Finally, tools that would assist politicians and decision-makers to find ways and budgets to improve the physical environment for pedestrians, including tools for economic analysis and tools for assessing joint benefits related to different fields of activity, including safety, health, the environment and quality of life.

- The PQN systems approach is not so much an alternative approach, but an Ad-on or advancement of the more basic reactive and calculative approaches.
- Regarding the development of the PQN systems approach, we are not there yet. The PQN systems approach is a ‘vision’ and ‘ideal’ but not yet practise. Still a lot of work has to be done to solve practical policy development and implementation issues, to simplify the approach into a mature strategy and document its added value in comparison with current strategies. There still are many question marks. However, there seems to be quite a bit of drive for follow-up projects. The main issue will be how to proceed from knowledge to implementation?
Policy process

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Introduction to the Policy process section’s structure and content

The ambitious aim of the Pedestrians’ Quality Needs project was to show the added value of a Systems Approach to supporting walking and sojourning in public space. Working Group 4 Integration and Coherence was assigned to substantiate this hypothesis. The first step was to develop a Conceptual Framework, which is described in Part A of the PQN Final Report.

It is found that a Systems Approach to support walking and sojourning has three interrelated dimensions: process, content and context. The organisation of the approach is featured by a systematic process design. The work within the process is directed at content, which concerns dealing with the pedestrians’ quality 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). Improving the situation for the pedestrian depends on the quality of the change process as well as the influences and reactions from the society and the physical and transportation environments.

The process design served 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. The COST Action setting means that the participants are not paid to do the job, and activities depend on the time and energy that they can spare. Consequently, full coverage is too much to expect. With regard to coverage, choices had to be made, depending on individual interests, competences and organisational backing.

In this Part of the PQN Final Report – Documentation, the contributions of the Working Group members are entered as they were submitted. Some of them could be submitted in time to be reviewed by external experts, others couldn’t. This introduction is designed to ‘glue’ the contributions together and place them in the process design framework.

The process design framework consists of 5 frames. The first frame concerns ‘Modelling the system’ and resulted in Part A of the Final Report on the Conceptual Framework. In future policy development processes in principle this step of modelling the system can be skipped, because its insights are meant to be ‘universal’.

The second frame of the policy development process concerns the development of a Reference Vision, picturing the desirable and expedient system, which later on can serve as a reference standard for the development of interventions and the evaluation of the changes to be made by the PQN plan. Within this second frame three sub-steps are distinguished: identification of needs, identification of quality requirements and defining the desirable and expedient system.

Discussions within Working Group 4 led to three papers relating to the identification of needs. It was found necessary to work out conceptual analysis of needs. The paper ‘The concept of needs’ by Kimmo Lapintie reflects this analysis. It pictures an analytical consideration of the
concept of needs, based on insights from literature, observations and logic. The paper does not specify what the concrete quality needs of pedestrians are.

Ralf Risser and Christine Chaloupka took a different perspective. They summarised basic theories and definitions of needs from a psychological perspective as well as empirical studies on the issue. Their paper ‘Needs’ provides concrete indicators for eight types of pedestrian needs.

Lapintie’s conceptualization and Risser & Chaloupka’s practical indicators served as input for the third source paper, by Rob Methorst, on the Identification of needs. Methorst argues that in practise concrete pedestrian quality needs relate to their abilities and the decision context. From the Identification of quality needs it should be a manageable step to translate the needs into requirements with regard to the social and physical environment and transportation options and facilities.

The policy development step of Identification of requirements is substantiated by Jürgen Gerlach through his proposals for a requirements checklist, as a practical tool for walkability and PQN inspections. The tool consists of detailed questions on features that support walking and sojourning in public space. It is meant as a first draft of a requirements guidelines and recommendations regarding pedestrian issue policy development, the physical environment, transportation and services to support walking and sojourning in public space. As there still is very little ‘mature’ information about non-infrastructural aspects and strategic policies and services for pedestrians, walking and sojourning, these issues need to be substantiated in future projects.

Obviously, a list of requirements with regard to specific items does not suffice as a reference framework for policy developments and proper evaluation of interventions for the support of walking and sojourning. Some requirements are more important than others; some of the specified requirements may conflict with more general ones and vice versa. Requirements point to desirable qualities of the pedestrian’s environment or pedestrian competences and abilities. Such qualities relate to usage, specific situations, cultural contexts etc. In the 5th contribution (section 5.7), by Hector Monterde and Diego Moreno (titled ‘Assessing the importance of qualities’), ideas on ranking qualities are presented and discussed. The discussion concerns a question, that is also addressed by Thérèse Steenberghen in her contribution (see section 5.12), namely ‘to what extent does the pedestrian system output reinforce the objective and subjective preconditions to fulfil the pedestrian needs?’

Both contributions can serve as sources for the definition of a desirable and expedient system for pedestrian, the Reference Vision, representing a merge of individual requirements into desirable opportunities for walking and sojourning. Within the context of the project it was not yet feasible to provide functional and consistent guidance for the development of dedicated Reference Visions.

The third frame of the policy development process concerns the Evaluation of the Actual State of the System. Within Working Group 4 this issue was broken up in two parts. The first part deals with how well the pedestrian’s environment and the conditions and opportunities that are actually offered, comply with the quality requirements as they are identified in the vision, in guidelines, legislation, policy statements etc. This part is discussed in section 5.8., by Nicole Muhrad, titled ‘Evaluation of the current system’. As this activity relies heavily on the maturity and consistency of the available material on requirements and even more the availability of information on the current situation with regard to the specified requirements, and such information is quite scarce, the paper can offer only expert opinions and suggestions that cannot yet be based on firm scientific evidence.

The second part of the third policy development process frame concerns the evaluation of how pedestrians actually function, and how satisfied they are with what their environment
Section 5.9. Evaluation of the pedestrians’ performance and satisfaction, by Rob Methorst, also suffers from limited information and data. By using multiple data sources and fine-tuned definitions, a picture of the real order of magnitude of performance indicators can be calculated. Thus, basic real-numbers figures regarding handicaps, mobility, importance of sojourning, risks and pedestrian satisfaction are presented.

The fourth frame of the policy development process is about the Exploration of improvements. Within Working Group 4 this stage was split up in two stages, namely the Identification of causal factors and mechanisms and the identification of promising interventions. The first task was tackled by Ralf Risser and Clemens Kaufmann and the second task by Lucia Martincigh.

Risser & Kaufmann’s article (see section 5.10) deals with the Identification of compliance and satisfaction mechanisms. They argue that, from a psychological point of view, compliance and satisfaction may be seen as belonging together in several ways. Rewards and sacrifices are dominant determinants for the outcome of decisions on services and measures for the support of walking and sojourning. The paper does not go into the evaluation of chains of events that lead to pedestrians’ performance problems. This perspective needs to be dealt with later on.

Lucia Martincigh’s contribution (see section 5.11) focuses, from an architectural perspective, on the identification of promising interventions. She delivers a solid account of the process followed to determine promising measures with regard to public space and city infrastructure design, on the project level. She touches on other types of optional solutions too, while interventions on more general levels and larger scale (regional, national) are not discussed. Still, the experiences, principles and methods can be inspirational for those levels as well.

The last, fifth, frame of the policy development process deals with the decision of interventions and ultimately leads to the implementation of interventions. A crucial step in this frame is the assessment of the pedestrian system output. The major issue here is to find out what the external effects are of proposed interventions for the support of walking and sojourning. Thérèse Steenberghen wrote a contribution on this issue (see section 5.12). Items to be assessed are the pedestrian system output regarding pedestrians needs, the survival, self-healing or correcting power in a wider context, the support offered by the pedestrian system intervention for ‘higher goals’ and lastly the degree to which the operators’ and decision maker goals are endorsed.

Within the context of Working Group 4 no work was done on the Formulation of recommendations and the Formulation of action plans. Work was planned to present Best Practises and Gaps in Knowledge. Gaps in Knowledge are presented separately in section B5.13. With regard to Best Practises the main conclusion from the discussion in Working Group 4 was that Best Practises should always be seen within their context; because of the complexity and the difficulty of finding good, general examples of good practises, it was decided not to include them in the Final Report.
1. Identification of quality needs

2. Identification of requirements
   → Audit checklist

3. Picturing the expedient system
   → General Goals and targets

4. Evaluation of the current state of the system
   → SWOT targets

5. Evaluation of performance and satisfaction
   → SWOT targets

6. Identification of compliance and satisfaction mechanisms
   → Cues for interventions

7. Identification of promising interventions
   → List of interventions

8. Assessment of potential pedestrian system output
   → Cues for fine tuning interventions

9. Formulation of recommendations for system input plan

Figure 1 (Sub-)steps in the pedestrian quality policy process
Identification of Pedestrian Quality Needs – A conceptual, systems-theoretic, and pragmatic analysis

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'We criticize a thinker more sharply when he proposes a tenet that is disagreeable to us; and yet it would be more reasonable to do this when we find his tenet agreeable' Nietzsche

Summary

The concept of need is discussed in the context of pedestrian and urban systems. The problems related to the identification of needs of pedestrians as isolated from the complex and autopoietic system of which they are part are addressed, and instead the definition of need is connected to human beings and social groups interacting in urban systems. The different disciplinary and scalar definitions of need are classified, and their relevance to the development of the pedestrian space is discussed. Finally, the functioning of the whole urban system is illustrated through an imaginary case of urban revitalization.

1. Introduction

In connection with the Working Group 4 of the Pedestrian Quality Needs COST Action 358, I took it as my task to study the identification of needs that could be relevant in the pedestrian and the larger urban and regional systems (taking into account the suburbanization and sprawl of the contemporary city). I soon realized that we have to address the obvious interdisciplinarity of the concept, since needs are discussed at least in physiology and medicine, psychology, social psychology, sociology, social policy, political science, geography, philosophy, and planning and policy studies. Since it would not have made sense to discuss, even superficially, the contribution of all these sciences, the natural alternative was to highlight the crucial differences in the different approaches and definitions of need. These definitions also seemed to correspond to a scalar distinction, many of the definitions concentrating on different scales. I distinguished between physiological, particularly homeostatic needs (dealing with the individual body in its physical environment), psychological needs (dealing with the individual psyche and its relationships and behaviour in the social and physical environment), social needs (dealing with social groups and social dynamics), aesthetic needs as an example of the larger group of normative/cultural needs (dealing with human cultural activities and their products), and political needs (dealing with

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1 In: Human, All Too Human
2 Wikipedia: Autopoiesis literally means "auto (self)-creation" (from the Greek: αυτό – auto for "self"; and ποίησις – poiesis for "creation or production"), and expresses a fundamental dialectic between structure and function. An autopoietic system refers to a living system is a ‘machine’ organized as a network of processes of production (transformation and destruction) of components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in space in which they (the components) exist by specifying the topological domain of its realization as such a network.
the legitimization of certain human wants and drives within the political system). Although this classification has some logic and underlines the complexity of the concept, it was not found useful by many of the scholars working in the COST Action and particularly WG 4, and it also generated a lot of misunderstandings. It appeared during the writing of chapters and discussions that there indeed were several, partly conflicting, conceptualizations of the systems-theoretic view of pedestrian quality.

However, we should not be too hard on ourselves in not being able to come up with a coherent theoretical framework for studying pedestrian qualities – even though the objective of the Working Group 4 was “Coherence and Integration”. Rather we should consider this natural, since there is still very little research work done on pedestrian qualities from the systems-theoretic perspective. Recent research even in such practical fields as transportation and policy studies have pointed out that issues such as the pedestrian realm will require rethinking of not only policies and planning of pedestrian space, but also our own structures of thought. For instance, Paul Stangl has discussed the roles that instrumental rationality, communicative rationality, and phenomenology might have in our understanding and development of the pedestrian realm (Stangl, 2008). The critique of instrumental rationality and the search for alternatives has, naturally, been going on for decades in philosophy and social theory and the respective planning theories (Habermas, 1984 and 1987; Forester, 1999; Healey, 2006). In more general terms, Tim Creswell discusses the historical and cultural roots of the contemporary paradigm of mobility (Cresswell, 2010), questioning the assumed backwardness and fixity of historical forms of mobility that are implicit in the contemporary discussion of high-speed mobility and ‘spaces of flows’ (Castells, 1996, pp 407-453). What we can safely say at the moment is that nothing in our conceptual framework can be taken for granted if we want to address seriously such a complex phenomenon as the pedestrian system and its context, the urban and regional systems with their cultural, social and political underpinnings. Our conceptual frameworks, just like any other works, are historically and culturally generated, and thus they also have to be subjected to cultural, social and political critique.

The only solution I could think of in this situation was to do some more research in order to understand the problems encountered. Since the governing theoretical umbrella of the Pedestrian Quality Needs is systems theory, I approached the problems through it, asking whether the original conceptual framework (and the storyline derived from it) represents the state-of-the-art of systems theory, or whether it could be extended to address the mentioned contemporary understanding of the urban context. Although not denying the value of a more straightforward process description model originally intended in the project, I will argue that such an extension is possible: some of the key features of city systems discussed in more contemporary literature, namely autopoiesis and complexity, will provide us with tools to discuss these issues. Secondly, I will discuss the relevance of different types of needs in this systems-theoretical context. Finally I will draw the conclusions for urban and regional practitioners informed by this discussion.

2. The Disappearing Pedestrian

The conceptual framework introduced in the project plan had the intention of placing the pedestrian at the centre and developing the urban system around him/her to suit his/her needs. The pedestrian was considered as a decision making entity with different levels of decision, “life-style, strategic, tactical, and operational” levels. In any one state of the city system, we may indeed distinguish individual pedestrians heading towards different destinations and sojourning in public space, as well as specific groups of pedestrians, such
B.5.3. The concept of needs

as the children, the adolescents, the elderly, and the disabled, who have different abilities and goals and, consequently, different needs related to the pedestrian environment.

The expressed aim of the Working Group 4 was, thus, to identify these needs of the relevant groups, translate them into requirements, consider the state of the pedestrian environment at the moment, its “optimal state”, and promising interventions to make it better. The aim as originally expressed was not to promote walking (that is, increase the number of people walking and sojourning in public space) but rather to satisfy the needs of the already existing pedestrians and thereby add to their quality of life (Project Plan 2006). Since the needs considered in this way probably are at least partly place- and culture-specific, and there was no possibility to describe these variations, it was suggested instead that generalizable methodologies could be introduced for identifying these relevant needs.

Although this storyline may at first sight seem innocent and realistic, we may immediately encounter problems if we try to follow it. Let us take one pedestrian, say Anne, a 23-year-old woman heading for her university class, out of this system and try to characterize her needs. But since we know that she has a variety of different wants, drives, and legitimate needs, which of these do we pick? According to Methorst, needs are something that one has to have for survival, while wants are “nice to have” (Methorst, 2010). However, this will not help us, since the woman is clearly alive and not about to lose her ability to survive, although she may take some risks for instance in pedestrian crossings (but risk-taking is part of being alive).

Should we, then, consider the needs, the satisfaction of which enables her to walk to her class? But this would be futile, since the very fact that she is already a pedestrian logically entails that these needs are already satisfied. But perhaps the woman does not feel satisfied, even though she is walking for economic or other reasons, that is, her life-quality is not at a satisfactory level? It is indeed possible to empirically measure expressed happiness and quality of life, but it is more difficult to connect these results to the urban environment; they are more evidently related to personal features, social relations, work satisfaction, etc. Even though some measurable correlations – with cultural variance - have been found between happiness and the residential environment (Alesina et al, 2004), they are mainly related to regional differences (living in a big city, suburb, or the countryside). But what is more, we have no way of defining a norm for happiness, that is, define a “satisfactory” level after which the city authorities can rest their case: “Quality is what we do!”

Another alternative would of course be to take into consideration those who do not walk, that is, the “non-existent” or potential pedestrians, and try to find out what would be required for them to choose walking and sojourning in public space. Adding to the qualities of public space (more cafeterias, better urban design, public toilets, safer crossings, etc.) might encourage them to choose walking instead of driving or public transport, and in this way we would encourage also Anne to spend more time in public space, not only rush to her lecture, or alternatively increase her happiness. But then our objective should indeed be to encourage or promote walking, and we may even set targets (so many more pedestrians in a day, so many more hours spent in public space, so much higher percentage of pedestrian trips as compared to other modes of transport). This target could be helped by analysing empirically what kinds of interventions would be most cost-efficient in promoting walking in this way. But this would be a totally different research question.

What is the problem here? It seems to me that these evident problems arise as soon as we try to take the pedestrian out of the system, consider her needs in isolation, and then try to fix the system in order to satisfy her needs. This is because, isolated, the pedestrian is no longer a pedestrian; she will preserve this role only with respect to the systems of which she is a constituent part. This is because the pedestrian or the wider city or regional or global systems are complex systems, whose constituent parts cannot be analysed in isolation.
On the other hand, if we try to handle the pedestrian as an inseparable part of the system, we are not dealing only with a complex but also dynamic and autopoietic system (Varela et al. 1974, Buchinger 2006). The system is dynamic in the sense that an intervention from its environment creates a series of changes in the system, which may in turn initiate new interventions when the system’s output changes. The earlier assumption was that the system would find a new balanced state as a reaction of the intervention, but this is no longer the prevailing assumption; the system is in a continuous process of change (Joutsiniemi 2010). An autopoietic system, on the other hand, is self-referential and able to create and recreate its structure and its constituent elements; typically biological and social systems are of this type (Luhmann 1986).

Considered from this systems-theoretic perspective, it does not seem to make any sense to speak of pedestrians that are “already there”, since this group will change every day, and also the perception of and meanings related to the pedestrian environment will change. The city is not a simple cybernetic system that could be adjusted around a set level of need satisfaction or happiness.

3. The Interdisciplinary Concept of Need

Instead of needs of pedestrians, thus, we shall have to address the needs of human beings and social groups and cultures. Being a pedestrian or sojourning in public space is not an identifying feature of any individual or group, since we are all potential and, usually and at least during certain periods of our day, even actual pedestrians. Thus walking and sojourning in public space is, rather, a means that some people choose to satisfy their needs, such as reaching a certain destination, making social contacts, etc. So if we intend to promote or encourage walking and/or increase user satisfaction of the pedestrian realm, we shall have to address these needs that are either necessary for the survival of the human being, or necessary for the continued existence of social groups and human cultures. These are the needs that human beings try to get satisfied, either by walking or – is this is not feasible – by avoiding walking.

Without trying to cover the vast literature on needs and their definitions, let us try to address the above-mentioned scalar differences in the concept, which is partly – though not exhaustively – reflected in the different disciplinary definitions of needs.

The concept of need may refer to physiology, that is, the need of the human organism to maintain a set level in order to remain alive, responsive and active. Secondly, it may refer to psychology, that is, the needs that individual human beings would like to see satisfied in order to feel happy, content, or meaningful, even if they were not be necessary for their individual survival.

These two types of need are not independent, of course: dissatisfaction of physical needs will have psychological effects (e.g. fear of dying), and dissatisfaction of some psychological needs will have physiological, somatic effects (e.g. anorexia). On the other hand, some of the psychological needs that are not necessary for the survival of the individual, such as sexual needs, are necessary for the survival of the species. Others, such as the need to communicate and build trust relationships with other people, are evidently necessary for the functioning social system.

As we move from psychology to sociology and political and cultural theory, we meet a very different meaning of need. In social and political systems, people are given and they acquire human and civil rights and duties, which are enforced by political and social systems. Thus
we talk about legitimate or public needs, needs that we have a right to, and correspondingly needs whose satisfaction is the obligation of the political system. These are often contrasted with wants, desires or drives that do not necessarily have social or political legitimacy. Personal survival and physical safety, sexual sovereignty, freedom of speech and social relationships, freedom of thought, etc. are usually the basic social values of democratic societies that support the legitimacy of certain needs. On the other hand, there are clearly desires and drives that are not legitimate in most societies, such as the desire to abuse children for sexual pleasure. What is problematic with the politically justified needs, as compared with the homeostatic and psychological needs, is that they cannot identified by descriptive science. There is no way to measure the legitimacy of social values and the needs they support; these distinctions are continually determined by the dynamic social and cultural system. The rights of the pedestrian versus those of the car driver, is a good example: there is a continuous debate on the right balance between the two. Researchers can participate in this debate, but they cannot provide the right answer.

There are thus many social and cultural needs that are far from self-evident, even if we were to remain within the existing state of cultural and political values.

Do we need cultural services such as art museums and classical music? Evidently many people feel that they need them, and cities and societies invests in them, even if many people – perhaps even the majority – thought they could do without. Do we need luxury cars and luxury apartments to demonstrate our social status? Do we need alcohol or drugs? Clearly there is no yes-or-no answer to these questions, since what is typical of social, political and cultural systems is that they are able to reflect on these issues, to redirect attention to problems and merits of different social values, and to discuss, legislate and educate accordingly. We cannot infer political or cultural values from physiology or psychology, not even sociology. There are, however, fields of research that are concentrated on the normative analysis and redirection of social values, such as ethics and social and political philosophy. The rationale of such normative research is not to dictate how people and societies should act, but to study the normative arguments and the coherence of different views.

One such fuzzy class of needs is the aesthetic needs. Human beings and societies have from the early civilizations on invested in the aesthetic refinement of their environment, in addition to its mere functionality. Although aesthetic pleasure can 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. So we don’t only have tastes (that one should not dispute on), but we also have refined and educated tastes. An experienced wine taster, a musician and an architect perceive the fine variations of cultural products that for the layman may simply be red or white wine, classical or rock music, or old and modern buildings. The aesthetic dimension thus has an inherent normative dimension that is studied in aesthetics as an academic discipline, in contrast to aesthetic pleasure studied in psychology.

Could we, then, list all the relevant needs, put them in a hierarchical order, and then try to satisfy them one after the other? Hardly, since the human perception and satisfaction of needs is more complicated than that. The supposed hierarchy would apparently start from the homeostatic needs necessary for individual survival, proceed to psychological and social needs that are necessary for the survival of the species, and then go on to communicative, political and aesthetic needs, ending in luxury needs. But even the satisfaction of homeostatic needs is often directed or intentional. Intentionality and the ability to deliberate and plan is the essential characteristic of human beings – we are not thermostats. If the weather is too cold, we start to shiver (and thus produce more energy from the muscles), but not only that: we prepare ourselves with suitable clothing even before we go outside, or we decide to remain inside or take the car. Thus we make individual strategic choices - using
technological means - to avoid situations where we predict that our physical coping mechanisms (such as shivering) are not adequate to keep us warm. The result may often be the avoidance of walking. On the other hand, this homeostatic need may be in contradiction with certain social needs, such as the need of young people to be accepted in their peer group, as well as to form social and sexual relationships. Thus we may see teenagers dressed according to fashion instead of functionality, spending their time in parks and other public spaces during the cold weather, since they have no cars or other warm places to go to.

4. Classification of Needs with respect to Walking

The systems-theoretic perspective, by itself an interdisciplinary framework, is of course one of the ways to make sense of these interrelationships. We may distinguish between different systems and their environments with distinct features. Starting from the homeostatic system, let us consider the following definition (related to the neural system) by Craeme Davis:

“A homeostatic system can be defined as having a constant output. Given this definition, there are several required features of a homeostatic signaling system. First, a homeostatic system has a set point that precisely defines the output of the system. As such, a homeostatic system will respond to a perturbation with compensatory feedback such that the set point activity of the system is re-established. A second essential feature of a homeostatic signaling system is feedback. Feedback is necessary for the design of any homeostatic signaling system, although it is not sufficient to achieve homeostasis.... A third distinguishing feature of a homeostatic system is precision. A homeostatic signaling system will precisely retarget the set point activity of the system following a perturbation. Nearly all homeostatic signaling systems also incorporate sensors that provide information regarding deviation from the set point activity of the system. Sensors report the difference between the set point of the system and the actual output of the system. This difference is an error signal that can be fed back into the system in the form of negative feedback that ultimately restores the activity of the system to set point levels.”

(Davis 2006)

The signaling system of potential walkers could similarly be characterized: feelings of cold or hot, thirst, hunger, and exhaustion are error signals that are fed back to the system as negative feedback. These signals, however, can be foreseen, and thus the human being can do strategic retargeting choices: move to central areas where all the services are nearby, take the car or the bus to shelter herself from cold, choose artificially cooled spaces, or avoid going out altogether, which is the choice that many elderly people make. They may also make tactical decisions, go and have a lunch, sit for a while on a bench, etc.

The human being as a whole, however, is not a homeostatic system with constant output, and neither are the social and cultural systems. The politicians cannot be satisfied with keeping the temperature of the citizens constant; they may have the objective to keep the temperature of the world constant, that is, avoid global warming and its environmental and economic consequences. They may also have the objective to promote equal access to services and other activities to all. One of the strategic measures may thus be the promotion of pedestrian and cycle traffic, as well as public transport. In so doing they would have to take into account the homeostatic needs of pedestrians, such as access to water, food, shelter and cooled environment, all of which add to the quality of the pedestrian environment.
Thus the provision of urban quality is related to the vulnerability and sensitivity of the human being as a potential pedestrian, and in particular certain groups of pedestrians, such as the elderly, the handicapped and the children, but also the urban poor. Interestingly, Rachel Aldred and James Woodcock have introduced the concept of a "social model of disability", meaning how car-dominated transport systems can be understood as disabling populations larger than those conventionally recognized as "disabled". The car offers the technological fix of enabling abilities, in particular speed and strength, but in practice disables parts of the population in a number of ways. Urban sprawl and traffic increase barriers to participation and access for many both "able-bodied" and "disabled", while car dominance damages social interaction and limits sensory perception (Aldred & Woodcock 2008).

But let us go back to the psychological, socio-psychological, and political systems, which are not homeostatic. One of the most elaborated and well-researched theories of psychological needs is the Self Determination Theory (SDT), which distinguishes three basic psychological needs: the need for competence, for relatedness, and for autonomy (Deci & Ryan 2000). All these relate to the outside of the individual human being, to his or her social relationships and ability to get esteem and function in a community. This conceptualization is based on the notion of effec tant motivaton by White (1959), according to which organisms are born with the urge to influence their surroundings, to control their environment and the attempt to be capable. Thus there is no clear distinction between psychological and social and even political needs: satisfaction of the needs of competence, relatedness and autonomy are equally necessary for active political participation as they are for domestic and working life (Renshon 1975). Conversely, dissatisfaction will lead to anxiety and/or withdrawal.

Thus the human beings as social agents cannot only be seen as receivers of certain qualities in the urban environment, but their activities and decisions will be related to their competence (how well they will be able to read the environment, adjust their action according to the situational context, etc.), their relatedness (how well the environment will allow for the different types of social encounter), and autonomy (how well they will be able to control their personal space, the distances between different people met in public spaces, as well as the ability to create a personal and emotional relationship to the environment).

The situation looks somewhat different, however, if we approach the human subject from the point of view of sociology or political theory. Let us only mention one of the key figures in these disciplines, Michel Foucault, who has studied the formation of the human subject from a historico-theoretical and genealogical perspective. In this context, the human subject is not only an individual with specific initial needs, but he or she is also a subject of power. In fact, the whole idea of a subject is formed through this political process of subjugation, which means the growth of self-control over overt physical control and discipline (Foucault 1976).

From this perspective, the public space is not conceptualized only as an asset satisfying pre-existing needs, but en entire control system – not only through SCTV's but also through the mechanisms of self-control. These disciplinary and bio-political powers, however, create the corresponding resistance through appropriation and redefinition of spaces. Streets may be turned into party spaces, vacant premises may be taken over, or parks may be re-modelled as living rooms for the immigrants.

As an overview of the different types of need discussed above, let us suggest the following initial classification of needs, their respective definitions, and the relevant issues and problems related to pedestrians:
<table>
<thead>
<tr>
<th>Type of need</th>
<th>Description</th>
<th>Relevance and problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeostatic/subsistence needs</td>
<td>Necessity of the human physical system to maintain a set level of temperature, nutrition, activity, etc.)</td>
<td>Provision of shade, shelter, resting places, public wells, restaurants and cafeterias, safe crossings, etc. Investment is often concentrated in central areas instead of suburban and exurban areas</td>
</tr>
<tr>
<td>Psychological needs</td>
<td>Necessity to reach e.g. relatedness, competence and autonomy in order to live a satisfying and meaningful life</td>
<td>Provision of accessible public and community spaces for meeting and communication, clear orientation and legibility, necessary control to ensure personal security. Zero tolerance against marginalized groups create segregation. Weakened community ties a problem.</td>
</tr>
<tr>
<td>Aesthetic needs</td>
<td>Preference for well-designed and/or meaningful cultural products and natural environments, can be refined through education and acquaintance with the arts</td>
<td>Provision of well-designed urban space, good materials and street furniture, scenic environments. Investment often concentrated in urban centres.</td>
</tr>
<tr>
<td>Social needs</td>
<td>Necessity of social groups to communicate and cooperate, as well as form social distinctions.</td>
<td>Provision of accessible public spaces for meeting and communication, clear orientation and legibility. Weakened community ties and social inequalities a problem.</td>
</tr>
<tr>
<td>Public/political needs</td>
<td>Facilities and services that are considered citizens’ rights that the political system is committed to. Disciplinary Control / subjugation.</td>
<td>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. Disciplinary control vs. resistance, conflict in urban space a problem.</td>
</tr>
</tbody>
</table>

5. Conclusion

How can we, then, conceptualize the complex, dynamic and autopoietic urban system as a whole, instead of only approaching it through the homeostatic, social and political subsystems? Systems are, of course, only models capturing some of the features that we want to highlight from the extremely complicated reality of cities and urban regions. In part B 2.5 I have discussed some of the general features and driving forces behind urban and regional development. Here I want to describe an imaginary case to illustrate the way that these driving forces and the different needs interact in the urban and regional system. Let us return to Anne, the 23 years old student walking towards her class at the university. Instead of taking her out of the system, we shall keep her connected and consider the dynamic changes around her, which will subsequently change her situation also.
Cities and regions are naturally no closed systems, but they receive information, capital and energy from the outside. One of the key features of contemporary urban development is that cities have to take care of their competitiveness, not only nationally but also internationally. Global cities such as London, Paris, Tokyo and Singapore, are compared more with each other than with the cities in their national periphery (Sassen, 2001). But even smaller cities will have to show features interesting enough for global investment. Since the new economy is information intensive, it is dependent on skilled workforce, which on the other hand looks for suitable housing and cultural and other services. Part of this workforce prefers suburban locations with good accessibility by car, while others prefer more urban locations. Since business has become more global, competitive airports in addition to the more traditional logistical services are necessary for any competitive region. And since the economy is knowledge-intensive, the cities will also have to develop their educational systems, in particular the universities.

Let us assume, now, that the city administration has found out that there are competitive advantages related to development of the pedestrian environment. The traffic is often jammed, the pedestrian realm is felt unsafe and uncomfortable, and there are too few favourable housing opportunities for the skilled workforce. Students like Anne are also starting to look for alternative higher education institutions. In order to change all this, the administration and the politicians come up with a development plan that includes investment in urban design in selected locations, such as the waterfront that is preferred by both tourists and businesses, coupled with housing regeneration in the city centre. Since the university attracts a lot of students with cultural capital but less monetary capital, they will also need affordable housing and good conditions for walking, cycling, and public transport.

There is, thus, a momentum for redevelopment of the pedestrian realm at least in the city centre, but perhaps also in some of the suburban locations that will house both students and the middle and working classes. Following the enhanced quality of pedestrian space, there will be more walking and more sojourning in the new public spaces, more investment and more students and tourists. However, major developments like this also change the symbolic character of these spaces. They may become exclusive, raising the property prices around them. This will suit the urban upper classes but not the original population; thus central locations will become gentrified and segregated, and the services will be mainly targeted for them, as well as the potential tourists. This has happened in many European cities that have experienced a major urban revitalization, such as Barcelona (Healey, 2010). The public spaces targeted for ‘decent’ activities and people will also attract unwanted activities and people, such as street vendors, beggars, alcoholics, and drug dealers. There are many policies that city authorities have adopted to deal with these problems, starting from zero-tolerance in policing and ending in street furniture designed to prevent sleeping in public space. The darker side of this development can also be the physical and social deterioration of the less favourable suburban ghettos, where the original dwellers are pushed as rents and housing prices are raised above their abilities.

Urban and regional development is, thus, not based on a decision by the city authorities to satisfy the needs of the people using the public realm. Rather it is a dynamic system where input from the environment (in terms of capital investment, information, national control, and global competition, etc.) suggests changes in all the constituent parts of the system. As an autopoietic system, each constituent part can react to the input and the changes in its environment in different ways: politicians may be changed, famous designers hired, and beggars policed out of sight. All this may or may not affect the way that one of these parts, our Anne, will orientate in her changed physical, political and symbolic environment.
Recommendations

- Development of the pedestrian realm in cities and suburban locations supports the economic and cultural competitiveness of the city and its region, particularly related to the needs of the new economy and the skilled workforce. Investments in pedestrian space, as well as cycle paths and public transport should thus not be considered as spending but rather as investment.

- Major urban redevelopment will also change the symbolic character and property prices of the areas concerned, and they may thus strengthen exclusion and segregation. This should be avoided by targeted policies.

- Competitive cities will always attract immigration and activities of all kinds. Cities should thus prepare for a more multicultural and differentiated urban culture.

References


Some thoughts about needs from a psychological perspective

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‘You can’t always get what you want, but if you try sometime...you will get what you need’
Rolling Stones

Summary

The paper gives an overview on the definition of needs, their relation to wants, motives and values as well as a short description of different models of needs (Maslov, ERG, Gasiet). Advantages and short comings of these models are discussed shortly. In the second part conflicts between different needs in relation to walking are discussed. Furthermore some preconditions which have to be fulfilled are presented. Finally, the integration of needs into the concept of quality of live is taken up in the last section of this paper.

1. Introduction

Needs lie behind everything that we do (Watzlawik et al, 1975). Therefore needs have to be considered in connection with all areas where human beings act. This is also valid for work in the areas of traffic and mobility. One typical problem in traffic is, though, that different needs collide with each others and conflicts of needs are inevitable. These conflicts can be localised on different levels. For instance, non-motorised road users assess their living conditions in relation to traffic preconditions like comfort, safety, etc., but they may well ignore the perspective that pedestrians have in these respects when sitting behind the steering wheel instead of walking. Consequently, the concept of quality of life is subject to different perspectives, as well.

Before discussing possible needs of road users, especially of pedestrians, we want to focus on some basic theories and definitions of „Needs“ and related terms for a better understanding and ideas of possibilities and margins for modification of the actual traffic circumstances.

2. Needs vs. Wants: Definitions

A need is 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 food and water, 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.

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 which they can afford.

### 3. What is the relation between needs and motives?

A motive is a tendency towards fulfilling or satisfying certain needs or to prevent unwanted consequences as reflections of non-fulfilment or non-satisfaction of needs.

### 4. Models of needs and motives

The first list that follows below refers to the so-called pyramid of needs of Abraham Maslow, a US-American social-psychologist:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physiological needs</td>
</tr>
<tr>
<td>2</td>
<td>Safety/security</td>
</tr>
<tr>
<td>3</td>
<td>Need for affiliation</td>
</tr>
<tr>
<td>4</td>
<td>Need for social acceptance</td>
</tr>
<tr>
<td>5</td>
<td>Need for self-verification/identity</td>
</tr>
</tbody>
</table>

### 5. Limitations of the Hierarchy of Needs model - Disadvantages

Care should be taken not to stick too rigidly to the principle of a hierarchy: In reality, people don't work necessarily one by one through these levels. They are much less structured in the way they satisfy their needs. Different people with different cultural backgrounds and in different situations may have different hierarchies of need. Other researchers claim that other needs are also significant or even more significant. See McClelland, who identified needs for achievement, affiliation and power. In 1968, Maslow has himself added additional layers in his book: "Toward a Psychology of Being".

Alderfer\(^1\) distinguishes three categories of human needs that influence worker's behaviour; existence, relatedness and growth. These “ERG”-Theory categories are in relation to Maslow:

- **Existence** Needs: physiological and safety needs (such as hunger, thirst and sex; Maslow's first two levels)
- **Relatedness** needs: social and external esteem (involvement with family, friends, co-workers and employers; Maslow's third and fourth levels)
- **Growth** Needs: internal esteem and self actualization (desires to be creative, productive and to complete meaningful tasks; Maslow's fourth and fifth levels)

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\(^1\) Clayton P. Alderfer - Existence, Relatedness, and Growth; Human Needs in Organizational Settings
In contrast to Maslow's idea that access to the higher levels of his pyramid requires satisfaction of lower level needs, first, according to Alderfer the three ERG areas are not stepped in any way.

ERG Theory recognizes that the order of importance of the three Categories may vary for each individual. Managers e.g. must recognize that an employee has multiple needs to satisfy simultaneously. According to the ERG theory, focusing exclusively on one need at a time will not effectively motivate.

In addition, the ERG theory acknowledges that if a higher level need remains unfulfilled, the person may regress to lower level needs that appear easier to satisfy. This is known as the frustration-regression principle. This *frustration-regression principle* affects workplace motivation. For example, if growth opportunities are not provided to employees, they may regress to relatedness needs, and socialize more with co-workers.

### 6. "Warm and Cold social need" - The Model of Seev Gasiet

Seev Gasiet has changed the scheme of Maslow somewhat, and most of all eliminated the hierarchical principle of Maslow's system. He divided needs and motives into four groups:

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

Gasiet sees no hierarchy either, but rather 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 \rightarrow interpersonal conflict of needs. "Competence" contains parts of the meaning of the English word "competition", with all its advantages but also disadvantages.

We can specify the above more social needs b. c and d. according to the following list that is taken from social-psychology literature. There is need of

- freedom, to be independent
- security (to feel safe and secure = fulfilment of relevant needs should not be threatened)
- company
- aesthetics, styling
- comfort
- convenient social climate
- entertainment/thrill
- dynamics/power
- competence and demonstration of it
- etc.

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.

7. Needs, Interests, Values

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 accepted standards for orienting one's 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
- **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, 2004) 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 1 and also [http://prompt.vtt.fi](http://prompt.vtt.fi)).
B.5.4. Some thoughts about needs from a psychological perspective

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:
- Health-care
- Good education
- To have work and good working conditions
- Leisure time
- Social environment and relations
- Safety and security
- Politics

Life quality

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- Good education
- To have work and good working conditions
- Leisure time
- Social environment and relations
- Safety and security
- Politics

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 WALCYNG2. 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.

Table 1 List of social aspects

<table>
<thead>
<tr>
<th>General terms</th>
<th>Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social impacts</td>
<td>The Maslow pyramid (see, e.g., Karmasin, 1993) can be used for analysing individual needs:</td>
</tr>
<tr>
<td>Life quality</td>
<td>- Physiological needs</td>
</tr>
<tr>
<td>Societal burdens</td>
<td>- Safety needs</td>
</tr>
<tr>
<td>Special terms</td>
<td>- Social needs</td>
</tr>
<tr>
<td>Health impacts</td>
<td>- Ego needs</td>
</tr>
<tr>
<td>Stress and anxiety (among others as accident consequences)</td>
<td>- Self-realization-/Identity needs</td>
</tr>
<tr>
<td>Equity and fairness</td>
<td></td>
</tr>
<tr>
<td>Social inclusion and social exclusion</td>
<td></td>
</tr>
<tr>
<td>Accessibility and usability</td>
<td></td>
</tr>
</tbody>
</table>

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.

2 WALking and CycliNG instead of shorter car trips
8. Needs and conflicts between needs

It is paradoxical that what individuals love to do often lead 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 awareness3: 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 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.

8.1. 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

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3 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)
are not being taken care of well, is detailed explanations as to which values\(^4\) 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"\(^5\) 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.

8.2. 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 10, 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):

<table>
<thead>
<tr>
<th>Explicit recognition as a value</th>
<th>Objective safety</th>
<th>Subjective safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognised by this group</td>
<td>Recognised by this group</td>
<td>Recognised by this group?</td>
</tr>
<tr>
<td>How is the value operationalised?</td>
<td>No accidents</td>
<td>No accidents</td>
</tr>
<tr>
<td>Situation</td>
<td>Interaction with pedestrians</td>
<td>Interaction with buses</td>
</tr>
<tr>
<td>Evaluation: Is the value protected?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Risser, 2000

8.3. 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

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\(^4\) 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.

\(^5\) 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.
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.

9. Pedestrian needs - indicators

When people (in the mentioned case non-motorised road users) assess their living conditions in relation to traffic preconditions (“the set scene”) they consider, among others,

1. the social values and motives (contacts, relationships, transactions)
2. health aspects, the provided comfort (“easy to walk”),
3. comfort
4. weather protection (against rain, sun, snow, wind),
5. safety preconditions (reflecting most of all the feeling of safety),
6. mobility (meaning the given possibilities to be mobile spontaneously),
7. aesthetics
8. Interoperability/usability

A traffic system should provide these preconditions also in accordance to the values of the above mentioned concept of Hakamies-Blomqvist & Jutila (1997; see further above), completed by number 8: interability/useability.

9.1. Social Values / feelings of equality

One problem, consciously or unconsciously experienced by non-motorised road users and residents, is the low status of those traffic modes, especially compared with driving a car. In contrast, the car symbolises such concepts as power, prestige, independence, freedom and status. Traffic calming e.g. gives officially more weight to walking and cycling. Furthermore, the nature of the interaction between different road users influences the feelings of self-assuredness. Traffic calming produces fairer preconditions for interaction. Also, the feeling of safety is largely affected by the nature of this interaction. The possibility of participation resp. of getting informed about social events and the kind of transport means and time needed to get there which helps to organise ones daily life (esp. for youngsters, elderly, handicapped).

**Indicators:**
- Traffic calming
- Interaction zones (“Begegnungszonen” 20km/h)
- Kind of reporting through media
- Reported feeling of equality in respect to other traffic participants

9.2. Health / Anxiety / Stress

Walking and cycling are good for health. As walking and cycling are often combined the following is also to be mentioned in relation to pedestrian needs: Calculations made by the Finnish Ministry of Transport and Communications demonstrate that if the amount of cycling in Finland would double, the savings in health costs and road upkeep would outweigh the costs resulting from the increase of cyclist’s injuries. The experienced health problems are minor as compared to the experienced gains and relate mostly to adverse health effects of
B.5.4. Some thoughts about needs from a psychological perspective

polluted air or noise. Good health is usually also reflected by the degree of one's subjective well-being. Feelings of insecurity are, besides ruthless car drivers, related to bad surface conditions (holes, broken surfaces) and very narrow pavements. Sharing of pavements with cyclists also causes feelings of unsafety.

**Indicators:**
- Degree of one’s subjective wellbeing and feeling of competence
- Degree of the subjective and objective status of health
- Degree of feeling of subjective safety and/or stress
- Kind of separation from cyclists and cars

**9.3. Comfort / Feeling of belonging**

The public road space is not only used for transport, but also for socialising, spending time and relaxing. Special facilities for the comfort of the people using road space in this way are benches, waste-baskets, finger-posts, shelters and public toilets, cafés, kiosks and restaurants, etc. The motor activities of non-motorised road users in a stricter sense are greatly affected by pavement conditions. Negative experiences are mostly caused by dirt or obstacles on the pavements, and they should be avoided. Feelings of insecurity are related to bad surface conditions (holes, broken surfaces, litter and glass) and very narrow pavements. If such preconditions are controlled to a certain degree, traffic-calming can contribute to comfort. Since walking is not only a means of transport, but also a way of socialising, spending time and relaxing, diverse facilities are seen as important for the comfort of pedestrians. Feelings of comfort and belonging together with security (for this complex in German: “Geborgenheit”, in Swedish “trygghet” – there exists no English word) awake the desire to come back to a place, to socialise with others. In a society of different cultures open air meeting places for cultural events and exchange of information seem to be of great importance for integration (also for people who have changed their place of residence).

**Indicators**
- Degree of one’s subjective feelings in relation to comfort or, on the other hand, stress
- Benches, waste-baskets etc. (that also can be used by disabled, children, etc.)
- Facilities to stand or to sit and talk (amount of space)
- Pavement conditions (maintenance, width)
- On request: being able to name people living on the other side of the street

**9.4. Weather protection**

Weather conditions affect people outside cars. If shade and shelter from rain are provided, which in many situations is quite easily done (e.g. at bus stops of public transport, with roofs in front of shops, etc.) a lot of "weather problems" can be solved.

**Indicators**
- Existence of shelters (e.g. at stops of public transport)
- Kind of road construction resp. provisions for not getting wet by passing vehicles

**9.5. Safety**

Experienced safety does not always correlate with objective safety. Experiencing sufficient safety by pedestrians is threatened by both cars and by bicyclists, especially that of the elderly pedestrians. Personal security can be felt as being threatened especially if illumination
is not sufficient. This is a problem especially for women. High numbers of pedestrians tend to increase both objective and subjective safety because of more social control of other people in the street.

Indicators
- Reported experienced safety
- Illumination of waiting areas at public transport stops or crossings (e.g. crossings without traffic lights but special illumination)
- Bushes cut down to about one meter around waiting areas
- Parking lots for bicycles to be protected from theft

9.6. Mobility / accessibility
There are two main mobility problems of non-motorised road users: The lack of space (narrow pavements or no pavements at all, no consistent walking network) and difficulties to cross roads where there is car traffic. In addition, smoothness of the road surface and better markings are desired. Also, long waiting times at traffic lights are experienced as a significant problem for smooth mobility, and traffic lights that provide a fairer distribution of time between motorised and non-motorised road users can be considered a great improvement in this respect. Mothers in general have the highest mobility requirements. Often their routes contain a whole chain of activities. On the way from work they do shopping, pick up the children and then go home. This role model may change but as long as it does not change typical mobility patterns and needs connected thereto have to be considered. The mobility of women is often concentrated on environmental friendly means of transport, such as cycling. The most important feature of traffic environment from the female perspective is therefore spatial proximity. The experienced problems relate to transporting children and shopping bags. For elderly and disabled stepping over high kerbstones, stairs without slides or elevators, obstacles on the pavements like parked cars, garbage cans, etc. can be decisive barriers, in the long run preventing them from leaving home.

Indicators
- Reported feeling of freedom to move when and where one wants to move
- Infrastructure elements of pavement and road surface which do not hinder to walk (no high kerbstones, no obstacles on the pavement)
- Possibility to pass/walk with prams, rollators, wheelchairs
- Elements which help pedestrians in orientation (esp. children, elderly and tourists/foreigners)
- City of short ways (if existing open houses with possibilities to walk through; make short cuts to parallel roads)
- Intelligent support at crossings (information about time left, acoustic information etc.)
- Traffic calming infrastructure elements which do not hinder pedestrians to cross or move around
- Traffic codes which support pedestrians
- Provision of public transport means with reasonable time-tables and possibilities to rest (esp. for elderly people)
- Maintenance of all different provisions once implemented
- Illumination (see also safety)
9.7. Aesthetics
Car drivers and passengers keep their eyes mainly on the road, higher speeds reduce peripheral vision. They – hopefully - notice movements in terms of other traffic, people and animals that could affect their advancing. When they look beyond the road in front of them they focus on bigger landmarks such as buildings. Pedestrians and cyclists, because of the slower pace, have time to look around and to really get to know the environment. Especially a green environment is valued. Noise of surrounding traffic and pollution are experienced as aesthetical problems as well – and they are also experienced as health problems.

Indicators
- Amount of green area in the cities
- Calm areas, little noise
- Colours which help to find one’s way (esp. surface)
- Reduction of the number of parked cars
- Places to rest and places to move kept in an attractive kind
- Cleanliness (esp. no excrements of dogs)

9.8. Interoperability / Usability
As pedestrians often are user of public transport and/or bicycles aspects of costs and supplies for heavy bags and safe and comfortable parking areas for bicycles have to be taken into consideration. Moreover the use of public transport will be improved if pedestrians’ needs on the way to and in the area around stops are taken more into consideration (e.g. about 70% of users of public means come to the stations by foot).

Indicators
- Baggage rooms for purchased goods (at public transport stops, train stations etc.)
- Parking places for bicycles
- Information at bus and tram stations which can be easily read also by disabled persons (big letters, well illuminated, at a reasonable height)
- Time information (not meters!) about walking distances, pointing the way to the next landmarks (post office, church etc.)
- Accessibility of public transport means (safe and comfortable crossings to reach them, low floor vehicles, etc.)

10. Integration of the above discussed parameters in the model of “quality of life”

Needs of pedestrians as shown in the former chapter can be integrated in a model of a wider perspective namely that one which represents “quality of life” aspects. The following explanations will give a description of this integrated model of pedestrian needs. The illustration is mainly taken from the final report of HOTEL (2004)

The idea of “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.

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6 According to EU-Project HOTEL 2004
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, quality of life research is in most cases based on both objective and subjective indicators.

Mobility preconditions provided by politicians, decision makers, etc and the perception of the objective conditions by citizens as well as subjective parameters lead to a certain behaviour of the citizens. In addition this behaviour can be influenced by communication policy. In fact, the communication aspect is of great importance in the assessment of quality of life with both positive and problematic implications. Marketing research has for instance pointed out the importance of the following: Good communication policy can make bad preconditions look better – however, with the risk of a boomerang effect: if citizens find out that they have been manipulated with the help of communication; and bad communication policy can make good preconditions look worse than they really are, with all disadvantages that brings about.

The following figure illustrates and summarises the relation between objective and subjective parameters, communication policy and behaviour, which has been discussed above:
10. Conclusion

Needs of pedestrians are an important issue if one wants to adjust traffic preconditions to the advantage of walkers. The problem is that in traffic different needs of different groups with different preconditions on different levels collide with each other. Such conflicts can be realised between individuals and groups or between individuals or between groups themselves or even within individuals.

 Preconditions play also an important role as people (in this case non-motorised road users) refer to them, among other things, assess their living conditions. Convenient use of the public space is central, because mobility in the public space is a central part of human life. In this frame, a good traffic system should provide agreeable preconditions for walking, otherwise walking will not be seen as an alternative to other modes of transport.

References


http://prompt.vtt.fi
Identification of quality needs

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‘...Of a good beginning cometh a good end...’

Summary

A logical way to support walking and sojourning in public space is to start with the identification of the pedestrian's quality needs. The main aim of the identification of pedestrian needs is to provide a valid, suitable and convincing ground for stipulating requirements for pedestrian facilities.

Basic pedestrian characteristics and abilities set the stage for pedestrian quality needs:

- Heterogeneity: almost everyone is or can be a pedestrian; individual needs and abilities to satisfy them vary from person to person
- The dimensions of a pedestrian: takes approximately 0,5 square meters of space, much less than other modes
- The walking average and maximum speed slower than (almost) all other modes
- The action radius of a pedestrian: less than other modes; depend on personal abilities
- A pedestrian not only walks, but also sojourns in public space
- A pedestrian is relatively vulnerable; they are not protected by a vehicle's structure.

A guiding principle for the identification of quality needs and stipulating requirements is Design for All, which postulates that it is most opportune to start from the needs of persons that do not have a choice but to walk and the persons that have most difficulties walking and sojourning. Approximately 50% of the population do not have a choice but to walk and use public means of transport for longer distances (Children, persons that do have a drivers licence or not own a vehicle, elderly and handicapped, poverty stricken people); 30 – 40% of the population has relevant functional limitations that restrict their mobility options (Asmussen, 1996).

Lapintie (2008) classified needs according to their scope for pedestrian existence. The most basic scope relates to human existence, survival and forgivingness of the environment when something goes wrong. A somewhat wider scope refers to psychological needs to feel at ease, to belong, to be respected and autonomous, living a satisfying and meaningful life. Other fundamental needs are aesthetic needs, social needs, such as the need to have contact with other groups, and public/political needs, which concern agreed citizen’s rights.

The same basic needs can have different appearances on the four optional pedestrian activity levels: lifestyle, strategic, tactical and operational activity levels. At the lifestyle activity level preconditions for walking and sojourning are defined. Information, proximity of relevant destinations, to feel at home, independence, social activities, free use of public space and equity are the dominant pedestrian needs. The conditions must be Convivial, Convenient, Connected, Conspicuous and Comfortable (the 5 C’s).
On the *strategic* activity level the same fundamental needs apply, but they are more concretely felt at temporary conditions and related to timely availability of opportunities. There is a difference in experienced needs between daily trips and new and incidental trips to unfamiliar grounds. For the latter certainty about conditions under way is a most relevant need. Aesthetics play a role in on-the-spot choices.

Needs on the *tactical* activity level concern do-ability of route choices, orientation, concentration on the walking task etc. and do not differ much from needs on the strategic activity level. Conspicuousness and unambiguousness are the most important needs.

*Operational* activity level needs touch dealing and reeling with concrete situations. The 5 C’s again are dominant general needs. Apart from that, skills to cope with the actual conditions matter most. Forgiveness of conditions is a crucial need, particularly in complex and dangerous situations. Convenience bears upon functionality, feasibility and suitability of situations for the task performance in specific circumstances. Free and unobstructed use of public space, shielding from motorised traffic, adequate walking facilities and security are especially important needs for vulnerable groups like children, women at night, elderly and disabled persons.

1. **Introduction**

Usually approaches to the walking and sojourning issues start with the identification of problems. In practise many actors, that can do something about the problems, sit back and wait until problems are reported. What happens is that each time they think they solved the problems, to their great frustration, new ones keep popping up. In this context it seems more sensible to focus on offering quality and prevent problems from arising. Such a strategy cannot start from reported or otherwise identified problems. In the PQN project it is argued (see PQN Final Report Part A – Introduction and conceptual framework) that a quality oriented approach has to start with the identification of pedestrian needs, followed by a translation of those needs into (quality) requirements concerning individual elements and structures in the pedestrian’s environment, including the physical environment, transportation, the social environment and legislation, behaviour rules and enforcement. A third step then is to form an image of the desirable state of the system, which defines opportunities that the pedestrians can use to satisfy the goals they want to achieve by walking and sojourning, like keeping physically fit or human interaction, going to school, to work, shopping etc. This image of the desirable state of the system can serve as a reference standard for finding out what needs to be done to design, support, manage and maintain adequate walking and sojourning conditions. The latter, of course, is a highly political matter, but it can be fed by academic knowledge.

In this paper the very first step in policy development, the identification of pedestrian needs, is described and substantiated. It needs to be said that it is not possible to conclusively identify all relevant pedestrian needs. After all, needs are relative. Different people have different needs. Individual and collective needs can vary with age, ability, climate, culture, lifestyle, time of the day etc. What can be done is to identify major needs and strivings that potentially lead to walking and sojourning in public space.

Bradshaw (1972) argues that there are many classes of needs relevant for policy making. The identified needs should not only include expressed needs and strivings, but also normative, comparative and felt needs (in section 3 of this paper we will take up Bradshaw's ideas). Likewise it is important not only to quest for manifest needs, but also for latent needs. After all, it appears that some needs are suppressed or hidden, like special safety needs of the elderly and handicapped because of their decreased abilities. The elderly and
handicapped themselves do not want to highlight them because they do not want to be pitied and seen as losers; such needs are not recognised socially and politically because there are no clear indications like generally available statistics and attention of the media. Methodology to assess needs must be suited for this task of providing a comprehensive picture of pedestrian needs.

The concept of needs is defined and substantiated in Chapter 2, section 2.4. of the PQN Final Report Part A – Introduction and Conceptual Framework. It was found that needs can be distinguished from wants. A deficiency regarding the satisfaction of a need would cause a clear negative outcome, such as dysfunction or death. Needs are necessary for survival and functioning in society, whereas wants are ‘nice to have’.

This PQN project only deals with legitimate pedestrian needs. Not all human needs can be seen as pedestrian needs. To be included in the study the satisfaction of the need should potentially lead to walking or sojourning in public space. Activities that one can fairly well do at home, without moving through public space, like sleeping and brushing one’s teeth, are not seen as a relevant need. Furthermore the project does not enter illegitimate needs, such as the desire to work off one’s emotions or the desire of paedophiles to abuse children for their sexual pleasure.

In this study attention is primarily focussed on needs and not so much on wants. It must be noted however that it is not always possible to unambiguously label a desire as a need or as a want. How a desire must be labelled will depend on the perspective one takes, the context, culture, abilities, the political aims etc. For example: if the general aim is that walking should be promoted so that people walk more and more often, then it is necessary to include wants and find ways of satisfying them, to provide the necessary extra attractiveness. If the aim of the exercise is simply to support whatever walking there is, a more modest approach limited to the identification of needs is opportune.

In PQN with regard to needs and pedestrian behaviour four activity levels are distinguished: lifestyle, strategic, tactical and operational. These different activity levels connect to specific types of needs with regard to walking and sojourning. At the lifestyle level they relate to behavioural features that set the scene for the strategic activity level. Being a 10-year-old child in Paris (= lifestyle level) for example means that you need to go to school a few blocks away (= strategic level decision by its guardians) and that you need to be able to cross some busy streets (tactical level decision) and that you need to get some gaps in the traffic flow to actually cross the street (operational level). In other words: there will be chains of needs, which can be satisfied by adequate measures at the concerned policy levels.

Key questions with regard to the identification of quality needs for policy development are:
1. Which pedestrians can be expected to be present in the targeted area?
2. What kinds of pedestrian needs can be identified on various activity levels?
3. What (usable) indicators for policy relevant existing and future pedestrian needs are there?

In the following sections these questions will be dealt with. In section 2 relevant pedestrian groups will be distinguished and described in general terms. In section 3, attention will be given to how relevant pedestrian needs can be identified. The sections 4 to 7 are devoted to the identification of pedestrian needs on the lifestyle, strategic, tactical and operational

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1 To a substantial degree the activity levels connect to specific types or levels of policy making. The lifestyle and strategic activity levels are mostly based on fundamental decisions that are conditioned by long term (national) policies, whilst operational activities are a response to situational factors, which can be influenced on the (relative) short term on the local level.
activity levels respectively. Section 8 goes into the matter of useful determinants. In Section 9 conclusions will be drawn regarding the identification of pedestrian needs.

2. Pedestrians in the area.

As needs with regard to mobility, accessibility, safety and health vary for different groups of people, it is necessary to find out what the relevant characteristics of the population in the area are. An interesting concept in this context is the concept of ‘New Standard Human’ (in Dutch ‘Nieuwe Normmens’) that was introduced by Asmussen in 1996. Asmussen deduced this idea from the concept of Standard Motorvehicle that Rijkswaterstaat (the Dutch national National Roads and Watersways Authority) used as a design reference standard for motorways. It is a theoretical construct that defines a standard motor vehicle that is used for the design of motorways. It includes characteristics like speed, dimensions of the vehicle, driving characteristics, braking distance, view from the vehicle etc. Asmussen argued that the current road and transport systems are not sufficiently accessible for vulnerable groups like children, elderly and the handicapped. According to Asmussen this is due to a number of factors (Asmussen, 1996):

- Currently the ‘average human’ from 20 to 55 in good health, that is someone without functional limitations, stands model for the traffic and transport system. This average person is not at all representative for the total population of walkers and sojourners in public space.
- It is the tradition to look at the traffic and transport system from the eyes of a car driver. Measures are taken and facilities are provided to ease car use (motorways) or to slow them down (speed reduction). The system makes other road users subordinate to the car user. Pedestrians and cyclist have to adjust themselves to the car. Even road safety organisations use this car perspective.
- Apparently the misunderstanding governs, that adjustments of the system need to be directed at providing for people with total loss of function, like the blind and wheelchair users and that these adjustments are also good for people with functional limitations like limited eyesight, walking disorders. Most of the times this is not correct. Adjustments like guidelines for the blind are counterproductive for persons with other limitations. The guidelines for adjustments for 35% of the population (in the Netherlands 6 million people out of 16 million), based on a systematic analysis of the influence of these limitations on participation in traffic and sojourning, are still lacking.
- The above misunderstanding is also to be found in the various guidelines and handbooks. There are guidelines for specific handicaps like the blind and wheelchair users (lowered curbs, guiding lines). These guidelines focus on person with total loss of a function; persons with limited abilities are not considered. Many communities follow the guidelines to the letter. Consequently the facilities are not suitable for large groups of road and public space users. The available and expensive facilities are hardly used. The money can be spent more wisely.
- The current patchwork guilt of facilities for the handicapped came into existence because road authorities asked for input from so called ‘hands-on’ experts. In cases where the

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2 Erik Asmussen was the first director of SWOV, the Dutch Road Safety Institute, until 1986. Erik was also professor road safety art Delft University. Around 1980 he lost most of his eyesight; since then he experienced his disability and the performance of associations of the handicapped. He decided to use his scientific knowledge to advance knowledge on designing roads and public space for everyone.

3 With this statement Asmussen refers to the practical interpretation of the premise in Sustainable Road Safety of ‘Man should be the reference standard for the traffic and transport system’. The question is: which human do you take as the reference standard? In practise it often is the car users.
opinion of more of such ‘experts’ was called, most of the times the opinions were conflicting. There is no ‘average’ elderly. An elderly often has a (specific) combination of functional limitations, and there is great variation in nature, degree and combination of the limitations. In practise input from groups of children, elderly of handicapped offers insufficient base for the development of a suitable system. This is only possible through a critical selection of functional limitations relevant for travelling, walking and sojourning.

Asmussen finds that it is possible to take stock of all relevant functional limitations and their occurrence. It is also possible to identify a Greatest Common Devisor, such that 90% of the road and public space users with functional limitations are included. This is called the New Standard Human. The three main categories are:

1. **People with functional limitations.**
   These individuals can make use of their residual capacity. In most cases they can and will compensate their limitations by making use of the residual capacity by using aids, like spectacles, magnifying glass, cane, walker, hearing aid, protective measures etc.

2. **People with total loss of function.**
   These persons do not have a residual capacity to fall back on and cannot make use of aids that amplify or compensate the residual functionality. They can only compensate the loss of function by calling on other senses and capacities or substitute means. Thus the blind use their tactile sensitivity or hearing for orientation; people with a total loss of the walking function use a wheelchair propelled by their arms or an electric scooter. It is clear that providing for people with total loss of function calls for entirely different adjustments than for people with functional limitations. The blind need texts in Braille or sound, tactile guiding lines instead of white guiding lines; wheelchair users need sloped paths instead of stairs, no thresholds etc.

3. **People with temporary disabilities and limitations.**
   A large part of the population cannot easily, comfortably and safely use the current transport system and public space. These groups includes persons with temporary limitations like injuries, illnesses and disorders, drug use, alcohol use, eye inflammations, fatigue, but also clouded spectacles, carried bags, pushed prams etc. For safety sake it is necessary that large safety margins are built in the system. Currently this is often not the case. It is a wonder that so few accidents happen. The threat remains however.

In Table 1 some indicative figures on the persons with relevant functional limitations are provided, for people with functional disabilities regardless of the severity. What stands out is that the number of persons with total loss of functions is small compared to the number of persons with functional limitations. The figures will vary from country to country, but the order of magnitude will probably be correct. Because of better medical knowledge and practises the numbers will change. Demographic changes, like the ageing of the population will cause the numbers to rise substantially.

In connection to the identification of relevant groups Vukmirović (2009) distinguished 5 main groups: Children, Adults, Elderly, People with mobility handicaps and Other groups. Depending on the depth of the analysis, sub-groups can be distinguished.

In Figure 1 relative sizes of the groups are indicated for the PQN countries. The total population in the PQN countries is expected to vary little, from 456 million people in 2000 to 470 million in 2020 and 457 million in 2040. The graph shows the effects of ageing of the population.

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4 For PQN Working Group 1 on Functional Needs, Milena Vukmirović wrote an article on Functional abilities of humans and identification of specific groups (see section B.1.11 in this PQN Final Report). This article serves as input for this section of the report.

5 Demographic data are taken from the U.S. Census Bureau, International Data Base (April 2009).
population on the relative group sizes. The groups of elderly pedestrians (65–79 and 80+ years of age) will increase, whilst the groups of young people (0 – 17 years) and adults (18–65 years) will decrease. The number of severely mobility handicapped people\(^6\) will almost double from 28.9 million people (6.3\%) in 2000 to 49.9 million people (10.9\%) in 2040.

Table 1 Indicative figures on number of (partially) handicapped persons

<table>
<thead>
<tr>
<th>People with total loss of function</th>
<th>in Netherlands 1995</th>
<th>per million of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair users</td>
<td>70,000</td>
<td>4,400</td>
</tr>
<tr>
<td>Blind</td>
<td>15,000</td>
<td>940</td>
</tr>
<tr>
<td>Deaf</td>
<td>20,000</td>
<td>1,250</td>
</tr>
<tr>
<td>Total</td>
<td>105,000</td>
<td>6,590</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People with functional limitations</th>
<th>in Netherlands 1995</th>
<th>per million of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children 0-14 years</td>
<td>2,800,000</td>
<td>175,000</td>
</tr>
<tr>
<td>Walking impaired</td>
<td>400,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Balance disorder</td>
<td>400,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Limited stamina</td>
<td>400,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Visually impaired</td>
<td>300,000</td>
<td>18,750</td>
</tr>
<tr>
<td>Hearing impaired</td>
<td>300,000</td>
<td>18,750</td>
</tr>
<tr>
<td>Cognitive and mental impaired</td>
<td>400,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Temporary handicapped</td>
<td>500,000</td>
<td>31,250</td>
</tr>
<tr>
<td>Parents with prams</td>
<td>500,000</td>
<td>31,250</td>
</tr>
<tr>
<td>Total</td>
<td>6,000,000</td>
<td>375,000</td>
</tr>
</tbody>
</table>

Source: Asmussen, 1996

Children 0 – 18 years of age

Children and adolescents have reduced ability compared to adults, due to their developmental immaturity and lack of experience. These differences are not only the physical appearance, but also concern characteristics that are acquired during the process of growing up. General characteristics for children, compared to adults, are:

- Small height
- Diminished peripheral vision
- Reduced attention and cognitive abilities
- Reduced ability to estimate speed and distance
- Difficulties in localization of sounds
- Unpredictable and impulsive reactions
- Lack of transport schemes and expectations
- Lack of understanding of complex situations

Infants and Toddlers (ages 0 to 4)

At this age, walking skills are just being developed and the children require constant parental supervision. Infants and toddlers have very limited abilities regarding walking and traffic. They are still learning to walk, their peripheral vision and depth perception is not yet developed and they are quite impulsive and unpredictable.

\(^6\) these (very) conservative estimations are based on NL figures from the national mobility survey (Socialdata, 2005). The figures relate to experienced mobility handicaps; when related to disorders the estimations would probably turn out to be some 30 – 50\% higher.
B.5.5. Identification of quality needs

Figure 1 Share of population groups in PQN countries

Young Children (ages 5 to 12)
At a young age, children have unique abilities and needs. Since children of this age vary greatly in ability, it is important for parents to supervise and make decisions on when their child is ready for a new independent activity. Children in this age group tend to be impulsive and unpredictable, limited in their peripheral vision and not very good at locating sources of sound. They lack experience and are not adequately trained for traffic participation. They are thrilled or easily excited by close calls, relatively short and therefore hard to detect by drivers. Furthermore they are prone to darting or dashing out into the intersection. They are likely to copy the behaviour of older people.

Teenagers (ages 13 to 14)
By middle school years, children acquired many of their physical abilities but still lack experience and training. Teenagers generally lack experience. They walk and bicycle more and at different times (have a higher crash exposure), they ride more frequently under risky conditions (in high traffic volumes), lack positive role models, more than average walk across more risky roadways (collectors and trunk roads), are involved in more intersection dash collisions and have a sense of invulnerability that makes them more willing to take chances.

High School pupils (ages 15 to 18)
By high school and college age, exposure to traffic changes and new risks are assumed. Many walk and bicycle under low light conditions. Other characteristics of this age group are that they are very active, can go long distances, and visit new places. They feel invincible, lack experience and training. They are capable of travelling at higher speed, but overestimate their abilities on hills, in curves and in other complex situations. The attempt to use bicycles, in-line skates, etc., based on practices copied from youth and they are willing to experiment with alcohol and drugs.

Adults 18 – 65 years of age
If we look at this group of pedestrians in relation to the characteristics and abilities of pedestrians, this group can be considered to be able to adequately perform their pedestrian tasks. Of course, there are some that can perform better than others, but the margins are rather small. Differences in abilities mainly vary because of differences in physical characteristics and physical fitness.
Adult pedestrians are persons aged 18 to 65 years. Within this age category two sub-groups can be distinguished (U.S. Department of Transport, 2009):

**Adults (18 to 40)**
These adults are highly competent in traffic and capable of perceiving and dealing with risk in most circumstances. This group is generally active and fully aware of the traffic environment, in most countries / communities they do not prefer to use a bicycle and they tend to be very interested and expressive regarding improving conditions.

**Middle-Aged Adults (41 to 65)**
During this stage of life, many pedestrians experience a gradual slowing down of the reflexes necessary to observe, assess, and respond to traffic conditions.

Besides these characteristics, the behaviour of this group of pedestrians will mostly be determined by other (lifestyle) factors like personal interests, professional orientation, employment status, income, etc. Dominant factors with respect to walking behaviour are income, ethnicity and religious affiliation (belonging to a minority) and place of residence (urban, suburban or rural).

**Elderly**
In the PQN project ageing\(^7\) 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\(^8\).

Based on characteristics and abilities of pedestrians in this age group we can recognize certain variations. They are a consequence of the gradual decline of physical and cognitive functions, which are quite visible after 75 years of age. Bearing in mind that these changes could affect any or several categories of abilities (physical, psychomotor, sensory or cognitive), older pedestrians generally exhibit the following characteristics and behaviours (U.S. Department of Transport, 2009; Methorst, 2010):
- With growing age they walk more, especially for exercise/independence.
- They may have reduced income and therefore, no car.
- With ageing people experience reduction in vision, agility, balance, speed, and strength.
- Some may have serious problems with hearing, extreme visual problems, and concentration.
- With age there is an increasing tendency to focus on only one object and activity at a time.
- Most have difficulty-hearing vehicles approaching from behind.
- All have greatly reduced abilities under low light/night conditions.
- Elderly may sometimes overestimate their abilities.
- With growing age the risk of falling and becoming seriously injured increases dramatically
- The elderly have a higher fatality rate than other pedestrians involved in collisions with motor vehicles.

\(^7\) Pedestrian Quality Needs Glossary in Appendix 2 of Part A of the PQN Final Report.
\(^8\) Generally speaking the generation between 65 and 80 does not have serious trouble walking, except when they have one or more handicaps. However, 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, which might be explained by uneasiness facing the acceleration of life in general. As a perceived risk it needs to be addressed.
People with mobility handicaps

People with disabilities are also more likely to be pedestrians than other adults since some physical limitations can make driving difficult or forbidden. According to a FHWA publication on providing access (1999), disabilities can be divided into three categories: mobility, sensory, and cognitive.

The group mobility impaired persons includes those who use wheelchairs, crutches, canes, walkers, orthopaedics and prosthetic limbs. However, many people with mobility impairments do not use support devices. Characteristics common to people with mobility limitations include substantially altered space requirements to accommodate support device use, difficulty in negotiating soft surfaces, and difficulty in negotiating surfaces that are not level.

People with sensory disabilities are more commonly thought of as total blindness or deafness, but partial hearing or partial loss of vision is much more common. Other types of sensory disabilities can affect touch, balance, or the ability to detect the position of one's own body in space. Colour blindness is also considered a sensory defect.

Cognition handicaps concern ability to perceive, recognize, understand, interpret, and respond to information. It connects to complex processes such as talking, knowing, memory, learning, and recognition. Cognitive disabilities can hinder the ability to think, learn, respond, and perform coordinated motor skills. Such individuals might have difficulty navigating through complex environments such as busy streets and might become lost more easily than others.

With the advanced age of 80 years, approximately 85 percent will have some permanent disability that limits one’s range of mobility. Disabilities are common through all ages, and the permanent disabilities constitute at least 15% percent of the population. Those with permanent physical disabilities, often kept away from society in the past, are now walking and bicycling regularly. Many others have temporary conditions, including pregnancy, and broken or sprained limbs that may restrict their mobility.

Other groups

Obviously some other groups of pedestrians can be distinguished, but their group size and characteristics are not sufficiently different to be separated. Possible parameters vary in relation to the professional commitment, habits, place of origin and living, etc. However, their differentiation would overlap mentioned groups, which already represented some of their characteristics.

Instead of physic, psychomotor, sensory and cognitive abilities, distinction can be made for activities performed during walking. This is analysed in some studies in the USA where specific groups were identified such as smokers, pet owners, people who consume food in motion, people who listen to music or talk to a mobile phone while moving (NYC Department of City Planning, 2006). Depending on the kind of action performed while walking, some specific abilities will be limited, e.g. a reduction of attention when talking by phone, the limit of hearing when listening to music during walking, reduced speed of walking during the consumption of food or the observation of encounters, etc.

In this study, these types of pedestrians will not be singled out as a distinct group. However, it can be recommended that some further research will be considered on consequences of doing other activities while walking.
3. How to identify needs

Because quality needs are subjective, it seems sensible to ask (potential) pedestrians what they need. This however has proved to be a very difficult and unrewarding task (Methorst, 2003; Lapintie, 2008; Risser & Chaloupka, 2009). A first difficulty is who to ask, since everyone is a pedestrian, but needs may vary substantially and not all needs will be equally important. Secondly, some basic functional needs are not recognised as a need, because they are assumed to be universally provided for anyway (the fate of common things…). Thirdly, some needs are recognised, but one is afraid, ashamed or too proud to admit them. Fourthly, some needs may conflict with other needs. Some needs are ‘permanent’ and universal, others are time or person related. In many cases individuals react predominantly on personal needs, ignoring other people’s needs (Risser et al, 2009).

As it is not easy and often not practical to ask pedestrians what they need, other sources need to be consulted. From literature it appears that with regard to needs there are a large number of theories and classifications. Unfortunately there is no general consensus on what needs (of pedestrians) are. In this report we therefore choose to take the practical point of view of combining some useful perspectives and ‘make the most of it’. As a consequence, in concrete (local) policy development processes, the listed needs that are presented in this report need to be verified.

A much cited classification of needs was developed by Bradshaw to assess the health needs of the population (Bradshaw, 1972). In his taxonomy he identifies four main, partly overlapping, categories of needs, relating to the perspective that is taken:

- **Normative need** is a need which is identified according to a norm (or set standard); such norms are generally set by experts. Benefit levels, for example, or standards of unfitness in houses, have to be determined according to some criterion.

- **Comparative need** concerns problems which emerge by comparison with others who are not in need. One of the most common uses of this approach has been the comparison of social problems in different areas in order to determine which areas are most deprived.

- **Felt need** is a need which people feel - that is, a need from the perspective of the people who have it (wants, wishes and desires).

- **Expressed need** is the need which they say they have. People can feel a need which they do not express and they can express needs they do not feel. As mentioned before: *motives* are expressed needs.

With regard to expressed pedestrian attitudes, motives and needs it is appropriate to take into account that some motives and needs are relatively conscious and others quite subconscious (Methorst & Vermeulen, 2004; Methorst, 2006). Examples of relatively conscious motives are autonomy, comfort and pleasure, responsibility, financial motives and status motives. Other needs, like consistence, obedience, competence (traffic competences, decision competences) are much more subconscious and thus harder to identify and to influence.

In this study the Bradshaw taxonomy will be used to position pedestrian needs as they are mentioned in empirical studies, guidelines, legislation etc. and for completing the picture, particularly regarding normative needs.

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9 For example many elderly will not admit that they need support to walk and postpone acquiring a walking stick or rollator or asking for help as long as they can (Methorst, 2003).

10 For example the need to get somewhere in time may conflict with the need for safety or the want to enjoy the walk. The consequence can be that one takes more risks than one otherwise would do or that one gets stressed.
In many policy papers mobility, accessibility, safety and health are seen as critical aspects of urban space and the transportation system. These aspects relate to human needs that are clearly acknowledged by politicians and can be seen as guiding for policy making for the support of walking and sojourning.

Pedestrian needs and wants are generally defined on the individual level: what does a pedestrian need or want to have. These needs and wants need to be translated and up-scaled to the ‘collective’ stakeholders’ frame of mind and span of control. In this study needs and wants are only relevant if they are socially and politically acceptable (cf. the category of public/political need as defined by Lapintie: see Section B.5.3 of the PQN Final Report). Methodology needs to include testing for these aspects.

Basically there are three routes to the identification of quality needs:

a. by deduction
b. inductively
c. combined approach.

**a. Deductive identification of needs.**

In principle the use of models that are based on deductive reasoning can lead to comprehensive coverage. They are however not automatically valid and reliable and depending on the quality of the model. Models need to be validated and verified by empirical evidence. Maslow’s hierarchy of needs and Lapintie’s classification of needs are examples of models that used mainly deductive reasoning to arrive at a list of needs. Maslow’s model, although plausible, quite popular and much used, produced a lot of discussion and was criticised and amended by many scientists. Lapintie’s model, although based on insights from a variety of disciplines, is new and not yet reviewed by the scientific community outside the PQN project.

**b. Inductive identification of needs**

The inductive approach uses identification by empirical evidence. The inductive approach does not necessarily lead to comprehensive coverage, because it relies on expressed needs.

Bradshaws’ taxonomy of needs shows that there are a number of methods to identify (reported) pedestrian quality needs. Basically the most ‘logical’ way to identify needs is to ‘simply’ ask pedestrians what their needs and wants are. This is not always possible, practical and does not always produce a true and comprehensive coverage of actual and future needs. Therefore alternative sources are needed:

- representatives of relevant groups
- guardians of vulnerable groups, that cannot speak for themselves
- conclusions from empirical and theoretical scientific research
- expert opinions and ‘best professional judgement’
- signals from the public media
- complaint accounts (records of received complaints, compliments, reports of faulty infrastructure and facilities etc.)

Received complaints usually represent only the tip of an iceberg. For most people minor annoyances are not enough to take action towards the authorities. A problem needs to rise to unbearable levels. In most of the times complaints need to be ‘translated’ to functional deficits. When things are all right, people will not come to their feet to say so.
accounts from various sources about countermeasures that people take to prevent misgivings (like keeping children at home or transporting them because of fear of road danger)

accountings from other cities, regions, countries and continents

future prospects and forecasting models.

When identified, the individual needs have to be classified, and that always involves some kind of deduction or modelling. The result depends on the quality of the survey and the questions asked.

In the context of the WALCYNG project Hakamies–Blomqvist & Jutila (1997) conducted an extensive literature survey on mobility related needs. Based on the results of that survey, Risser & Chaloupka (2009) state that when people, as non-motorised road users, assess their living conditions in relation to traffic preconditions ('the set scene') they consider, amongst others:

1. social values and motives (contacts, relationships, transaction)
2. health aspects, the provided comfort ('easy to walk')
3. comfort
4. weather protection (against rain, sun, snow, wind)
5. safety preconditions
6. mobility (meaning the given opportunities to be mobile spontaneously)
7. aesthetics
8. interoperability/usability.

c. Combined approach

A combination of the deductive and inductive approaches can compensate for the inherent limitations of them. The classification that Lapintie devised, offers a general comprehensively covering framework for classification of needs on the four discerned activity levels. Vukmirovic’s classification of pedestrian groups can be used for the specifying general and group specific needs (Vukmirovic, 2010). The cells within the framework can be substantiated by information from various sources: literature, statistics, archives, the internet, dedicated surveys and ‘best professional judgement’. In the following sections knowledge regarding major pedestrian needs is presented. The results are summarised in tables 6, 7, 8 and 9.

In a policy development process the relevance of identified needs and wants depends on the stakeholder’s position, particularly what the stakeholder can offer to do to maintain, manage or improve quality for pedestrians. In this context it is important that a tailored methodology to assess quality needs is offered. A major distinction in methodology relates to the activity level that policy making is directed at.

As Steg & Vlek (2009) argue, needs are not fixed and static. In practise they will be influenced by societal developments as well as the subject’s abilities and the opportunities offered. Assuming that in a given situation, opportunities offered can be seen as a constant, distinction can be made in general needs, that apply for all pedestrians and specific needs, which relate to the pedestrians’ (group’s) abilities.
4. Needs on the lifestyle activity level

Needs on the lifestyle activity level are long term general human needs. Survival is the most basic human need, and humans have a need to survive as a species (Darwin, 1859). In this context human activities should not go at the expense of the survival of the community on the short and longer terms. As a consequence there are limits to the acceptability of individual needs that conflict with collective public/political needs. In other words: human activities must be ecologically and environmentally sustainable. Thus sustainability can also be seen as a basic need and precondition.

Basically humans need to maintain a set level of temperature, nutrition and activity. They need to be protected from external dangers, like too high or too low temperatures, natural threats and traffic. General homeostatic or subsistence needs are health, safety, usability of the walking and sojourning facilities, proximity and accessibility of essential functions and comfort.

The endeavour to survive translates into different long term needs for the various groups of pedestrians. As individuals children for example, need to be enabled to grow up and acquire abilities to satisfy their mobility needs later on. Adults need to be able choose or create an environment where they can function as a human being and maintain their health. Adults need to have work, good working conditions, physical activity. The elderly and the handicapped need to be supported to be able to function in society. Thus, different stages of life induce different motives and needs for walking and sojourning in public space.

On the lifestyle activity level preconditions for mobility, accessibility, safety, health and sustainability are laid down. Pedestrian needs in this regard relate to a variety of personal characteristics, his or her social and physical environment and the availability of transport:

- **lifestyle factors**: age, gender, education level, physical and mental abilities, stage of life, employment state, income, family ties, social environment, culture, place of residence, vehicle ownership, availability of walking aids etc.
- **climate**
- **natural landscape features**: ‘natural’ barriers like rivers, canals and lakes, woods and scrubs, availability of flat land or walkable slopes, steep hills and mountains etc.
- **land use characteristics**: degree of urbanism, the character of places of residence, relative locations of schools, work places, recreational facilities
- **transportation characteristics**: public transport availability, pricing level and system etc.

For walking and sojourning there is a fundamental difference between persons who have a choice to use other modes and those that do not. In Europe the social inclusion principle is generally supported and in this context the PQN project places the Design for All principle central. As a consequence the identification of needs should be focussed on persons that do not have a choice but to walk, so called captive pedestrians. For walking and sojourning, stage of life, abilities and transportation options seem to be the most important life style factors (Vukmirovic, 2009). In general this concerns children, the elderly, people with mobility handicaps who can still walk to some extent, people without a driving licence and poor people (Methorst, 2003).

**Homeostatic/subsistence needs**
Many existential walking and sojourning needs are age related. Young children need learning experiences, which moving, playing and sojourning in shielded public space can offer. Physical activity, like walking, running and climbing, is important for growing up healthy and forms a precondition for later-life health (De Vries, 2009). For performing these activities,
children need a sufficient amount of shielded space that offers carefree playing conditions. As they do not yet need to travel through public space to acquire food, other necessities for living, mobility needs are limited. Most of the times they can and are not allowed to go beyond reach of their parents and guardians. Because of their limited physical and mental abilities they need to be protected from all vehicular traffic and kept away from all kinds of dangers like water, ditches, steep slopes etc.

With growing age and experience children learn to cope with more dangers. Thus they can be allowed to go farther from home and perform increasingly more complex tasks. Their territory expands and strict protection and supervision become less needed for survival. This usually happens stepwise: a toddlers’ action radius is some meters from home, later come shielded play grounds, then guided walking to primary school, later on independent walking to school. At the age of 8-10 the (independent) action radius on foot often is extended to several hundred meters from home. A further step in action radius takes place when a child learns to ride a bicycle and later on moves on to go to secondary school.

Research in Switzerland has shown that withholding opportunities for walking and playing can have detrimental effects on a child’s mental and physical development (Huttenmoser, 1995; Bogaard, 1999); lack of exercise can lead to serious health problems (WHO, 2004).

With advanced age humans lose their agility, walking takes more energy and the type of risks while walking change. Comfort and the availability of resting places becomes a more important need. For children and adults traffic usually poses greatest risk of serious injury and death. For elderly people the risk of falling is far more serious; for the old-old minor level differences combined with bad street lighting can pose severe risks to the point that they give up walking after sunset. For them the general quality of the surface and absence of obstacles is the dominant safety need (Methorst et al, 2010). It can be assumed that lack of exercise because of absent opportunities to walk, just like for children, has a detrimental effect on the health and life expectancy of the elderly.

For walking and sojourning proximity and accessibility of desirable destinations appears to be a decisive factor. Within a neighbourhood a walking distance of approximately 15 minutes is acceptable for almost everyone (Leidelmeijer & Damen, 1999). As walking speed varies with walking abilities, for children and elderly people this will put the action radius to approximately 1,000 meters, for persons with a mobility handicap it will be substantially less. On the other hand, for young, healthy adults 1,500 meters will be the practical limit. Above this distance other modes or connectivity to other modes becomes an issue. If there are no desirable destinations within walking reach, walking will be limited to, only if reasonably possible, recreational walking and walking the dog. In sum: there need to be desirable destinations within reach, if not, then there will hardly be any walking; this will have a negative influence on perceived safety and security. Inhabitants that have a choice will choose other travel modes and go elsewhere to satisfy their mobility needs. Others will simply suffer (Risser, 2009).

In some cases individuals can choose to move to a more suitable place of residence. Many however have firm roots in their place of residence and will only decide to move if they are forced somehow or when they experience a fundamental change in their life, like graduation, marriage, change of job, retirement, loss of a spouse or becoming disabled. Apart from consequences of demographic changes, in practise the collective basic subsistence needs of inhabitants of an area can be expected to be rather constant over time.

Psychological needs
As for psychological needs on the lifestyle activity level: humans need to feel at home, safe and secure, and free to move around, so that satisfaction of relevant needs is not threatened; health is supported by absence of anxiety and stress; entertainment and thrill, dynamics and
power, feeling of equality are also needs that are connected to lifestyle activity level decisions (Risser & Chaloupka, 2009). For children support by their guardians and exiting surroundings are important (Dol & Kips, 2009), whilst for the elderly independent mobility, safety and security are major needs (OECD, 2001). Karmasin (1993) finds that territory, competence and demonstration of it are also relevant needs that humans have.

**Aesthetic needs**
Lapintie (2008, 2010) argues that humans have aesthetic needs. Although aesthetics will hardly be a matter of life and death, it is evident that aesthetics is an important factor in decisions on the lifestyle activity level. Since people usually do not have a good impression of the actual functional characteristics of a neighbourhood, like proximity to essential services and walkability, aesthetics are a great selling point. Furthermore, a nice house and attractive neighbourhood support their identity, wellbeing and competence and confirm that they made a good choice settling there.

**Social needs**
Relevant social needs on the lifestyle activity level concern interaction with other people and groups that position walking and sojourning. The kind of support walking and walkers get in the media is one aspect. Risser & Chaloupka (2009) identify a number of social needs that apply on the lifestyle activity level. Mentioned are a convenient social climate and social cohesion, company, which connects directly to Lapintie’s definition: necessity of social groups to communicate and co-operate. Gasiet’s ‘warm’ and ‘Cold’ needs, which are respectively affiliation and social relationships, and dominance and being better.

**Public/political needs**
Lastly, public/political needs point to facilities and services that are considered citizen’s rights that the political system is committed to. Parts of these rights are codified in the European Charter of Pedestrian’s Rights (European Parliament, 1988), national legislation (highway codes, Code de la Rue, and various guidelines and rules for road and public space authorities) and on the local level in local legislation.

In 8 articles The European Charter of Pedestrians’ Rights (European Parliament, 1988; see Appendix 6 of Part A of the PQN Final Report for the full text) sums up assumed pedestrians’ needs. In the first articles the Charter stipulate that:

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.

Article VI of the Charter specifies what the pedestrian specifically has a right to expect regarding the noise and pollution, speed limits and road design, advertisement that encourages improper use of cars, signing in relation to the deaf and blind, infra-structural pedestrian facilities and liability in case of accidents. Article VII describes the need for integrated transportation and inter-operability.
### Table 2 Needs on the Lifestyle Activity Level

<table>
<thead>
<tr>
<th>Lifestyle activity level</th>
<th>Life quality needs</th>
<th>Source</th>
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<tbody>
<tr>
<td><strong>Homeostatic/subsistence needs</strong></td>
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<tr>
<td>general</td>
<td>Survival and sustainability</td>
<td>Bruntland</td>
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<tr>
<td></td>
<td>Health (subsistence, exercise, reproduction)</td>
<td>WHO</td>
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<td></td>
<td>Usability (Mobility, Accessibility: walkable neighbourhood)</td>
<td>European parlement</td>
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<td></td>
<td>Proximity and accessibility of (essential) functions</td>
<td>Tira</td>
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<tr>
<td></td>
<td>Safety</td>
<td>OECD</td>
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<td></td>
<td>Comfort</td>
<td>Risser</td>
</tr>
<tr>
<td>Children</td>
<td>To grow up and learn</td>
<td>Childstreet</td>
</tr>
<tr>
<td></td>
<td>Room to move and play in public area; carefree playing conditions</td>
<td>Childstreet</td>
</tr>
<tr>
<td></td>
<td>Physical activity</td>
<td>Childstreet</td>
</tr>
<tr>
<td></td>
<td>Proximity of schools and play grounds</td>
<td>WHO</td>
</tr>
<tr>
<td>Adults</td>
<td>To have work and good working conditions</td>
<td>Risser</td>
</tr>
<tr>
<td>Elderly</td>
<td>Optimal physical condition</td>
<td>WHO</td>
</tr>
<tr>
<td></td>
<td>Proximity of services (medical assistance, food store, drugstore, personal care)</td>
<td>OECD, Methorst</td>
</tr>
<tr>
<td>Handicapped</td>
<td>Optimal physical condition</td>
<td>?</td>
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<tr>
<td>special groups</td>
<td></td>
<td>p.m.</td>
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<tr>
<td><strong>Psychological needs</strong></td>
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<tr>
<td>general</td>
<td>Feel at home in the area</td>
<td>Hupkes, Zahavy</td>
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<tr>
<td></td>
<td>Average Mobility budget of approximately 1 hour 15 minutes</td>
<td>Risser</td>
</tr>
<tr>
<td></td>
<td>Freedom to move around</td>
<td>Risser</td>
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<tr>
<td></td>
<td>Health = absence of anxiety, stress</td>
<td>Risser</td>
</tr>
<tr>
<td></td>
<td>Security (to feel safe and secure = fulfilment of relevant needs should not be threatened)</td>
<td>Risser</td>
</tr>
<tr>
<td></td>
<td>Entertainment / thrill</td>
<td>Risser</td>
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<td></td>
<td>Dynamics / power</td>
<td>Risser</td>
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<td></td>
<td>Territory, competence and demonstration of it (ego-needs)</td>
<td>Risser, Karmasin</td>
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<td></td>
<td>Feeling of equality</td>
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<tr>
<td>Children</td>
<td>Support by their guardians</td>
<td>OECD</td>
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<tr>
<td></td>
<td>Exiting surroundings</td>
<td>Childstreet</td>
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<td></td>
<td>Safety and security; supervision</td>
<td>OECD</td>
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<tr>
<td>Adults</td>
<td>Leisure time</td>
<td>Risser</td>
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<td></td>
<td>Social environment</td>
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<td></td>
<td>Independent mobility</td>
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<tr>
<td>Elderly</td>
<td>Independent mobility</td>
<td>OECD</td>
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<td>Information on accessible functions</td>
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<td></td>
<td>Safety and security</td>
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<td>Handicapped</td>
<td>Independent mobility</td>
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<td>Information on accessible functions</td>
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<td></td>
<td>Safety and security</td>
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<td></td>
<td>Assistance and support in needy situations</td>
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<tr>
<td>special groups</td>
<td>Independent mobility</td>
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<tr>
<td><strong>Aesthetic needs</strong></td>
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<tr>
<td>general</td>
<td>Attractive environment</td>
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<tr>
<td>Children</td>
<td>Clues for boundaries</td>
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<tr>
<td>Adults</td>
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<tr>
<td>Elderly</td>
<td>Clues for orientation</td>
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<tr>
<td>Handicapped</td>
<td>Clues for orientation</td>
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<tr>
<td>special groups</td>
<td>p.m.</td>
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### Table 2 Needs on the Lifestyle Activity Level - continued

<table>
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<tr>
<th>Lifestyle activity level</th>
<th>Life quality needs</th>
<th>Source</th>
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<tbody>
<tr>
<td><strong>Social needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>• Kind of supporting through media</td>
<td>Risser</td>
</tr>
<tr>
<td></td>
<td>• Convenient social climate – social cohesion</td>
<td>Risser</td>
</tr>
<tr>
<td></td>
<td>• Company</td>
<td>OECD</td>
</tr>
<tr>
<td></td>
<td>• Security and public safety</td>
<td>Gasiel</td>
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<tr>
<td></td>
<td>• ‘Warm’ social needs (affiliation, social relationships, etc)</td>
<td>Gasiel</td>
</tr>
<tr>
<td></td>
<td>• ‘Cold’ social needs (dominance, ‘being better’ etc.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Self-verification / competence</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>• Presence of children in same age group</td>
<td>Childstreet</td>
</tr>
<tr>
<td>Other groups.</td>
<td>p.m.</td>
<td></td>
</tr>
<tr>
<td><strong>Public/political needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>• Healthy environment</td>
<td>European Parliament</td>
</tr>
<tr>
<td></td>
<td>• Urban space tailored to human beings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Places for social contact, especially for children, elderly and handicapped</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Disabled can ask for facilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dedicated pedestrian areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Noise and pollution control</td>
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</tr>
<tr>
<td></td>
<td>• Ban on improper car use promotion</td>
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</tr>
<tr>
<td></td>
<td>• Integrated transport, inter-operability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Equity and fairness; generally supported behavioural norms and rules</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Social inclusion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Affordable housing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Free use of public space</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Safety and security</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Serious consideration of pedestrian interests in public domain policy and planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Facilities to support a wide scope of lifestyles: health-care, good education, to have work and good working conditions, leisure time, social environment and relations, safety and security</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Politics</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>• Education</td>
<td>Risser</td>
</tr>
<tr>
<td></td>
<td>• Right to access to public space (Declaration of London 2004)</td>
<td>Child in the city 2004</td>
</tr>
<tr>
<td></td>
<td>• Children need to be able to grow up</td>
<td></td>
</tr>
<tr>
<td>Adults</td>
<td>• Adults need independent mobility particularly for properly enabling them to participate in economic activities.</td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td>• Elderly people need independent mobility to keep their dignity, support their health and happiness, and to prevent economic burdens to society of otherwise needed services</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>• Handicapped people need independent mobility to keep their dignity, support their health and happiness, and to prevent economic burdens to society of otherwise needed services</td>
<td></td>
</tr>
</tbody>
</table>
A practical way for identifying major public/political needs is to look at how government is organised in ministries, departments and sections and the degree to which they are involved in policies that support activities in public space, particularly walking and sojourning. Such structures are likely to reflect the existing political culture. In this regard policy plans and annual reports can be valuable sources.

With regard to public/political needs Risser & Chaloupka (2009) mention the needs for equity and fairness, generally supported behavioural norms and rules for and towards pedestrians, social inclusion, affordable housing, free use of public space, quality sojourning, serious consideration of pedestrians in public domain policy and planning and facilities that support a wide scope of lifestyles: health-care, good education, to have work and good working conditions, leisure time, social environment and relations and safety and security as well as the right to participate in politics. Dol & Kips (2009) additionally mention children’s right to access public space. Regarding the elderly and disabled persons the OECD quotes their right to independent mobility to keep their dignity, support their health and happiness and to prevent economic burdens to society of otherwise needed services.

5. Needs on the strategic activity level

Pedestrian needs on the strategic activity level concern day-to-day manifest needs, subsequent decisions taken at one’s whereabouts on activities to be performed, and the planning of the trip towards the chosen destination. Basic choices are to go or not to go, where to go, how to go and what precautions to take. Motives are generally categorized according to travel motives, like going to school, to work, work related trips, shopping, visiting, recreation, escorting etc. Decisions are based on expectancies: whether it is feasible to arrive at the destination, what one knows or feels, what one can expect along the way, the energy it will take to arrive at the destination, the risks and the rewards that one gets for getting there or penalty for not getting there etc.

It is often assumed that travel surveys adequately cover walking and sojourning in public space. After all, survey report on in trip frequencies per travel motive, modal choices and distances travelled. With regard to walking and sojourning however, in practise such surveys rarely give the full picture. Respondents ‘forget’ to report short trips, particularly the ones towards and from other modes. Most of the times the survey reports do not specify walking trips as part of the journey. Tentative research by the Dutch Pedestrians Association and Methorst et al showed that 30 – 50% of time spent or distance covered walking was so called multi-modal walking, and only partially showed up in mobility statistics (Knippenberg, 1993; Methorst et al, 2010).

With regard to sojourning in public space it appeared that there is only indicative information available. A limited number of countries carry out time spending surveys. Some of these surveys give information on the frequencies and time spent outside homes, but it is not clear whether this time is spent in public or private space, let alone whether it concerns urban, peri-urban or rural area (Sauter, 2009).

It is however evident that the amount of time spent in public area varies at least for age, climate and culture. Children spent more time sojourning (playing) in public space than other groups. In Mediterranean countries people ‘live’ on the streets more than in for example Scandinavian countries. High rise apartment building children spent less time in public space than children in low-rise suburban areas etc.
**Homeostatic/subsistence needs**

Basic needs with regard to a journey are that the destination suits the subject’s purposes and that the subject is able to arrive at the desired target without manageable trouble, at reasonable cost in terms of energy, money and stress. This means that, within the margins of the subject’s competences and abilities, desirable destinations need to be conveniently connected to the place of origin. The route to the destination or transfer point should be conspicuous (findable), convenient (direct, without obstacles), comfortably walkable and free of unmanageable risks of accidents or violence (safe and secure). The eventual transfer to other modes should be convenient, conspicuous, easy, comfortable and safe, and the walking trip afterwards should also suit the pedestrian’s needs (Gardner et al, 1996). The elderly and disabled persons need resting places (seatings) and toilet facilities. In cases of emergency, assistance and support need to be available and accessible.

Another important fact is that almost all pedestrian behaviour is ‘natural’ and automated behaviour (Vermeulen, 2003). Most individuals do not have to take conscious decisions on where to go, how to choose a route, how to walk and behave in concrete situations. Only during the process of acquiring skills for a new role or during extremely difficult situations people display conscious, planned behaviour. However, one’s walking and traffic related skills could be inadequate. Particularly children, the elderly and handicapped persons sometimes are not aware of the actual deficiencies in competences and skills.

In this context it is especially important for children, elderly and disabled persons that there is a self-evident convenient route available between origin and suitable destination. That route needs to be free of unfamiliar complex traffic situations, that need to be dealt with on a knowledge or rule based level of competence. Such situations are potentially risky because time pressure can lead to wrong decisions. Situations need to be predictably designed, so that they can fall back on effective routines based on their earlier experience in traffic (skill based level behaviour: cf. Rasmussen, 1983).

**Psychological needs**

The vast majority of journeys are made to familiar destinations close by. Most of them are made regularly, are perfectly feasible and there is sufficient certainty about what to expect both from the situation at the destination and under way. Decisions regarding the moment of departure, how to get there, mode to use, precautions to take and things to bring are taken intuitively and subconsciously.

For trips to unfamiliar destinations however, people have a need for confidence regarding the convenience of alternatives, like the suitability of optional destinations and the journey towards the destinations, their safety characteristics, the energy it will take to get there and the return the various alternatives will give.

From mobility surveys it is known that uncertainty about how to get from a train station or bus stop to a final destination makes some people decide to take the car, particularly because navigation devices are expected to guide them to the exact location of their final destination without the potential discomfort of waiting for a connecting bus, stress or fear of getting lost and arriving late etc. For the same reason some persons might take the car for trips that in practise would be perfectly safe to walk in less than a quarter of an hour. This shows how important adequate beforehand information is.

Persons who are not confident about their abilities to cope with situations under way, like many elderly and disabled persons, have a strong need to be certain that they will not get surprised by unexpected mishaps. In this context the elderly and disabled persons need certainty about the availability and accessibility of resting places, toilet facilities on the route (for routes that take more than 30 minutes) and assistance in cases of emergency.

Leidelmeijer and Daamen (1999) found indications for people to have a travel time budget that is connected to perceived functionality or the expected reward trip type according to motive (Leidelmeijer et al, 2000). If important destinations in one’s neighbourhood like shops, medical services and letter boxes, can be accessed on foot within the allocated time frame, it showed that other modes often are not considered, even when they are somewhat faster.
There are some indications that the time needed for preparation of the journey may go at the expense of the total travel time budget. Parents of children, elderly and handicapped seem to need more time to prepare their journeys than travel competent and healthy adults, who simply go and can take the risk of something going wrong. The hypothesis is that uncertainty because of perceived reduced competences, forces people to take more time for preparing the journey; the extra preparation time is taken from the allocated time budget, leading to a reduction of acceptable distance for the actual journey.

**Aesthetic needs**

It is public knowledge that people prefer to walk to visually attractive destinations, via scenic routes and sojourn in well designed and kept areas rather than go to ugly and messy buildings and public spaces, via unattractive, cluttered roads. It appears that people have a clear need for aesthetics and that visual attractiveness plays an important role in decisions to go and sojourn somewhere. This is particularly true for non-daily visited destinations, for less urgent travel needs that can be satisfied by a variety of ways, like recreation and fun-shopping, and for sojourning decisions. Pedestrians tend to keep away from derelict areas, cluttered, waste infested streets, industrial areas, and wastelands. Surroundings need to be of human scale, tidy and well kept, colourful, offering clues for orientation. Greenery is highly valued.

As Lapintie (2008, 2010) argues, aesthetic experiences are person, group and culture related. Such experiences are relative: ‘nice’ exists at the grace of ‘ugly’. Also, the meaning of the visual experiences differs for individuals. For example for children bright colours and piled rubble are quite attractive (Dol et al, 2009). For the elderly and handicapped associations to safety and security, in many cases, is a dominant decision factor (OECD, 2009).

**Social needs**

Most journeys are at least partially made for social reasons. School, work, visiting, and recreation offer needed opportunities for social contacts. While under way, pedestrians need at least a neutral social environment. On short daily utilitarian trips in general walking is just functional: getting from A to B, without much need of person-to-person communication while under way. On longer and less frequent trips and for sojourning social aspects (contact, communication, friendliness, safety and security, absence of stressors) are important.

For children the presence of other children in the same age group is important. For the elderly, retired, out-of work and disabled persons walking offers opportunities to meet other people, which they do not ‘naturally’ get from work or school situations.

**Political needs**

In European countries the free accessibility of public spaces is considered to be a citizen’s right (European Parliament, 1988). Public spaces, and especially sojourn areas like residential streets, shopping streets, central squares, recreation areas are expected to be safe and secure for all, tidy, well kept and supervised adequately.

Pedestrians bank on that pedestrian space is respected and kept free of obstacles and moving vehicles. For children accessible and shielded playing areas are seen as a basic right in every residential area. The elderly and handicapped are entitled to independent mobility, including shielded routes and proximity of essential services.
### Table 3 Pedestrian needs on the Strategic Activity Level

<table>
<thead>
<tr>
<th>Strategic activity level</th>
<th>quality needs</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Homeostatic/subsistence needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>Convenient, Connected, Convivial, Comfortable, Conspicuous. Sheltered situation along the way Unbroken chain towards destination Walkable cities and trails Proximity, inter-modality, interoperability Adequate information and time to contemplate the information</td>
<td>Gardner et al Risser Risser</td>
</tr>
<tr>
<td>Children</td>
<td>Shelter from traffic Carefree playing conditions</td>
<td>Childstreet</td>
</tr>
<tr>
<td>Elderly</td>
<td>Proximity of services Resting and toilet facilities on the route Emergency assistance Absence of complex (demanding) situations</td>
<td>OECD Hendriks et al, NZTA</td>
</tr>
<tr>
<td>Handicapped</td>
<td>Shelter from traffic</td>
<td></td>
</tr>
<tr>
<td><strong>Psychological needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>Certainty about what to expect while travelling and sojourning Feeling of equality Health = absence of anxiety, stress</td>
<td>SWOV</td>
</tr>
<tr>
<td>Elderly</td>
<td>Certainty about feasibility to travel independently, safety and security</td>
<td>OECD</td>
</tr>
<tr>
<td>Handicapped</td>
<td>independently, safety and security</td>
<td>OECD</td>
</tr>
<tr>
<td><strong>Aesthetic needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>Orientation: identity of routes and situations Conspicuousness Tidiness and neatness</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>Colourful and green</td>
<td>Childstreet</td>
</tr>
<tr>
<td>Adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td>Functional design</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>Functional design</td>
<td></td>
</tr>
<tr>
<td><strong>Social needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>At least neutral social environment</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>Presence of other children in same age group</td>
<td>Childstreet</td>
</tr>
<tr>
<td>Adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td>Communicative people</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>Attentive people</td>
<td></td>
</tr>
<tr>
<td>special groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Public/political needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>Sojourn area separated from traffic routes High quality accessible public spaces Freedom to use public space Surveillance, public safety</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>Accessible and shielded playing areas</td>
<td></td>
</tr>
<tr>
<td>Adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td>Shielded routes, proximity of services</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>Independent mobility</td>
<td></td>
</tr>
</tbody>
</table>
6. Needs on the tactical activity level

Pedestrian needs on the tactical activity level concern functionalities in the walking environment that support or enable the performance of satisfactory tactics with regard to routes to take, orientation, concentration of the walking task, walking speed, places to stop and stay for a short while or cross the street, and precautionary defence mechanisms that prevent potentially dangerous acts. Tactical and operational behaviour are not clearly separated. In principal, tactical decisions are based on one’s ideas, projections and recollection of experiences in past situations. Operational behaviour on the other hand is a reaction to observed situations. Sometimes, however, tactical decisions, like where to cross the street, are made as a reaction to observed traffic flow (Papadimitriou, 2009).

Homeostatic/subsistence needs
Basic homeostatic/subsistence needs on the tactical activity level are connectedness, safety and security of the route to travel and space to sojourn in. Services, public spaces and buildings need to be connected to one’s origin. Public transport and other relevant follow-up modes need to be accessible (inter-operability). The routes need to be legible, and there must be clues for orientation (landmarks, guidance, posted street names). The route environment must be forgiving and offer shelter for cases of emergency. There must be information on potential obstacles on the way. Children need to be shielded from traffic and other potentially dangerous situations, like watersides, abysses, large animals etc. For the elderly and handicapped facilities, like seating and handrails, and toilet facilities are needs. Especially for them adequate lighting conditions are also important.

Psychological needs
While travelling, general psychological needs are the need for autonomy, equality, absence of anxiety and stress. Pedestrians have a need to be treated respectfully by other users of public space, including ‘naturally’ dominant drivers. The pedestrian’s environment needs to be reassuring and must evoke confidence in one’s ability to cope with the situation. Because of their lesser competences, for children, the elderly and handicapped persons the standard is higher than for others. Particularly on non-daily longer trips people have a need for ‘friendly faces’ to make them feel at home. At night, security is an especially important need for women and the elderly.

Aesthetic needs
Scenic environments, well-designed and well-kept urban spaces serve a purpose. Visual cues help pedestrians to orientate themselves; nice environments can help to make them feel welcome and feel good. Children need attractive visual cues. Exiting surroundings and objects support their zest for learning experiences.

Social needs
Public space needs to offer opportunities for planned and accidental meetings of other people. Safety and security of the spaces are a precondition. Children need social contacts for learning experiences; many elderly and handicapped are dependent on accidental contacts in public space to combat loneliness. A general need is social inclusion.

Public/political needs
Pedestrians need to be attributed equal rights on the use of public space. Like other road users they need a connected, convenient, convivial, conspicuous and comfortable network, but they also need sojourn space. They need a much more dense network than other modes. After all, walking is the only mode of transport that is open to all citizens; all properties need
to be accessible on foot; in each trip begins and ends with walking; the action radius of pedestrian is less than that of other modes.

Urban areas need to be understood as sojourning areas in the first place. On major roads (connector/distributor roads, trunk roads and motorways) priority can be given to motorised traffic, but in sojourning areas, like residential areas, shopping area and central office locations, conflicts with traffic should be prevented. Major roads must not form a barrier for pedestrian movement. Pedestrians need to be facilitated to cross such roads at for them convenient locations; at the crossings traffic speed should not exceed 30 km/h. At higher speeds collisions tend to be lethal for pedestrians; at that speed motor vehicles can spot and react to crossing pedestrians in time to prevent collisions.

### Table 4 Pedestrian needs on the Tactical Activity Level

<table>
<thead>
<tr>
<th>Tactical activity level</th>
<th>quality needs</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Homeostatic/subsistence needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>• 5 C’s&lt;br&gt;• Legibility of the route environment&lt;br&gt;• Clues for orientation (landmarks, guidance and posted street names)&lt;br&gt;• Forgiving environment&lt;br&gt;• Information on potential obstacles on the way</td>
<td>Gardner et al&lt;br&gt;Lapintie&lt;br&gt;SWOV&lt;br&gt;Risser</td>
</tr>
<tr>
<td>Children</td>
<td>• Home zones / low traffic sojourn areas</td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td>• Resting facilities and (Public) toilets&lt;br&gt;• Adequate light conditions</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>• Resting facilities</td>
<td></td>
</tr>
<tr>
<td><strong>Psychological needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>• Autonomy, equality, independence&lt;br&gt;• Friendly faces&lt;br&gt;• Health = absence of anxiety, stress&lt;br&gt;• security</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>• Dedicated supervision</td>
<td></td>
</tr>
<tr>
<td>Adults</td>
<td>Women: security</td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td>Security</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>Security</td>
<td></td>
</tr>
<tr>
<td>special groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aesthetic needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>• Provision of well designed urban space&lt;br&gt;• Scenic environments&lt;br&gt;• Good materials and street furniture&lt;br&gt;• Clean and tidy environment</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>• Exiting surroundings and objects</td>
<td></td>
</tr>
<tr>
<td><strong>Social needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td>• Opportunities for meeting&lt;br&gt;• Safety and security</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>• a variety of playing sites and meeting places for learning experiences</td>
<td></td>
</tr>
<tr>
<td>Adults</td>
<td>• Females: security</td>
<td></td>
</tr>
<tr>
<td><strong>Public/political needs</strong></td>
<td>• Equal rights re. use of space&lt;br&gt;• 5C’s conform network&lt;br&gt;• Urban area is sojourn area</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>• Dedicated supervision</td>
<td></td>
</tr>
<tr>
<td>Elderly</td>
<td>• Resting facilities</td>
<td></td>
</tr>
<tr>
<td>Handicapped</td>
<td>• Support under way</td>
<td></td>
</tr>
</tbody>
</table>
For their functioning, children, the elderly, handicapped persons and persons that do not have access to individual vehicles, depend on walking and connecting public transport options. For them connectivity, convenience, safety, conspicuousness and comfort of the walking network form a safety net.

7. Needs on the operational activity level

Pedestrian needs on the operational activity level concern the actual walking and sojourning in public space. On the operational level behaviour is mostly a reaction to what happens in the pedestrian’s immediate environment. It is about reacting to interference of traffic and other users of public space, dealing with objects and obstacles, the walkway surface, slipperiness, the weather, light situations, time to cross, space to walk, gaps in traffic, visibility, personal energy etc. Decisions are based on what one sees, feels or hears and relate strongly to one’s felt competences and abilities, and of course, the support one is willing and able to muster (walking aids, assistance, guidance and coaching).

Almost all pedestrian’s behaviour on the operational level is skill based, automated behaviour (cf. Rasmussen, 1984). Exceptions are ‘newcomers’ like young children and revalidating persons that need to (re-) learn walking, and situations where task demands are bordering or crossing the limits of one’s competences and abilities. The latter can for example be the case for temporary disabled persons, distracted or extremely tired persons and persons under the influence of alcohol or drugs. Such exceptional conditions are known to be important failure types in pedestrian accidents.

Homeostatic/subsistence needs

General pedestrian homeostatic/subsistence needs concern survival in traffic and public space, and basic walking task performance. Gardner et al sum up the general pedestrian needs as 5 C’s: Convenience, Conviviality, Connectedness, Conspicuousness and Comfort (Gardner et al, 1996).

The survival need is reflected in Conviviality, which corresponds with liveability. It includes both ‘objective’ and perceived traffic safety, security, sojourning options and thus covers shelter from potentially dangerous traffic, absence from physical threats and intimidating persons or groups of people, and absence of surface conditions that can cause someone to fall and be injured or even killed. In practise slippery surfaces, unevenness of surfaces and undetected obstacles produce more casualties than conflicts with traffic, particularly amongst the elderly.

For children traffic accidents are a dominant accident risk. They cannot yet cope with traffic and need to be shielded from traffic, particularly traffic flows. Disabled persons have difficulties coping with walking anyway, making every journey they make more risky than for most people.

In general pedestrians, connected to conviviality, need forgiving environments, which do not mercilessly punish them for mistakes that they make in their reaction to walking conditions or other actors in their environment (Wegman & Aarts, 2005). This is especially important for children, as they cannot yet cope with most complex situations and naturally make more ‘mistakes’, and for the elderly as with age they have increasing trouble coping with complex situations, they are relatively fragile and take much longer to recover from injuries. For them simplicity and predictability of situations is crucial to be able to react ‘automatically’ on a skill based level, not having to use precious time reaction time that they may not have.

On the operational activity level Convenience bears upon functionality, feasibility and suitability of the environment for the performance of the pedestrian’s tasks. It refers to room to move, the energy that it takes to walk or sojourn, absence of obstacles to get around, simplicity of the situation and to operate technical interfaces, suitable crossing opportunities,
minimum waiting time, manageable crossing distances and sufficient crossing time, and for longer (multi-modal) walking trips: inter-operability, that is accessibility and usability of vehicles to be used for the continuation of one’s journey. 
While for the average able adult pedestrian walking speed usually is 1.2 meter/second or more, children, the elderly and disabled persons move much slower. Consequently they need more time to cross a street and are exposed to oncoming traffic longer. 
With regard to the energy that the walking effort takes, flat terrain and routes are ideal. Young and able persons can climb rather steep slopes and long stairs, but in this respect the elderly and disabled have limited capacity to cope. They need facilities like lifts and dedicated ramps. The elderly need resting facilities (seatings), depending on the energy it takes to walk (Hendriks et al., 1998).
Targeted destinations, whether these are final destinations or transfer points to follow-up modes, need to be accessible and reachable from one’s starting point. This is reflected in the pedestrian needs for Connectedness.
Walkers walk over paved and unpaved terrain. They need to orient themselves, to place their feet and, to react to the walking conditions and things that happen, they need to be able to sense their environment. This need is reflected in Conspicuousness. It comprises both notability of walking situations and public space users as well as visibility of the walkers themselves, so that other people can react to them. Visibility of potentially dangerous situations should not be obstructed, and this works in two ways: for the pedestrian and for ‘opponent’ road and public space users. Especially children and small people are easily hidden from view and can have difficulties to observe oncoming dangers.
The human body has narrow tolerances for atmospheric conditions. Pedestrians need protection against high or low temperatures, abundant sun, wind, rain and snow. They also need to be able to get food and drinks in time. They need to be comfortable to perform properly. Comfort directly relates to convenience, walkability and the degree to which performing the pedestrian’s tasks takes efforts and energy. Wet feet, for example, can make people feel uncomfortable and may hinder one to properly function or distract them and make them do risky things.

**Psychological needs**
Humans have needs to feel at ease, to belong, to be respected and autonomous. In this context they also need simple, workable and acceptable behavioural rules and norms and absence of anxiety and stress. In traffic they need to be respected as a fellow road user and be allowed to cross whenever this is called for. Unpredictability of traffic and traffic gaps can cause anxiety, particularly when crossing. Especially for the elderly and disabled it is important to be allowed and enabled to walk independently, to be granted leeway while crossing a street and permitted to simply enjoy their stay in public space.

**Aesthetic needs**
Aesthetics are enjoyed on the spot. From public polls it is known that cleanliness and tidiness rank high in appreciation of public space. Number one annoyance often is ‘dog excrements’. Absence of litter, graffiti, no cracks in the pavement are also seen as important. Other valued aspects are a human scale of the built environment (as opposed to an overwhelming built environment), absence of monotony and ‘natural’ features like parks, trees, shrubbery, hills and rocks.
A valued spatial identity is can be a reason to be there, and is directly related to aesthetics. For children nice colours and exiting forms are desirable.
Social needs
On short, daily utilitarian trips social needs do not seem to be specially demanding. In leisure time however, sojourning in public space often is driven by social needs, like the need for interaction and communication with other persons and groups. People go to interesting areas like parks, market places and shopping streets to meet and enjoy other people.

Public/political needs
The pedestrian's public/political needs on the operational activity levels concern facilities and conditions that citizens (as pedestrians) consider they have a right to. To some extent these rights are codified as formal traffic behaviour rules and regulations for road and public space authorities. The felt rights can also extent to other norms and values that exist in society that are not yet ratified at any governmental level.

In the European Charter of Pedestrians’ Rights (European Parliament, 1988) it is declared that pedestrians have the right to a complete and unimpeded mobility. With regard to the operational activity level article IV-g indicates that the pedestrian has a particular right to expect:

"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 be protected from motor car traffic, provision of parking and rest areas and subways and footbridges)"

On the National level traffic legislation generally stipulate behavioural rules about the pedestrian's place on the road, the free use of sidewalks, footpaths etc. and restrictions for other users, crossing at (formal) pedestrian crossings, favourable rules in Home Zones\(^\text{12}\) and the rights of disabled persons.

There is a general public feeling that pedestrians need to be separated from traffic and that sidewalks offer adequate protection\(^\text{13}\). The pedestrian is promised sufficient space and free use of pedestrian space, without obstacles. In most countries it is forbidden to park cars on sidewalks. Parking of bicycles does not seem to be restricted however. In most countries home zones are becoming the standard for residential areas.

Pedestrians have a need for equality, meaning that they need to be treated the same as other road users. A complicating factor is that most pedestrians can assume other road user roles as well, and that they often deem those roles more important. This may compromise their needs / rights as a pedestrian.

Pedestrians, especially women and the elderly at night, have a need to be offered security. Many women and elderly people at night have a fear to be assaulted, mugged or raped. It is generally felt that children need to be able to play in the vicinity of their homes without a chance of getting harassed or molested.

In all European countries the population is ageing\(^\text{14}\). From some policy papers it appears that there is a growing awareness that pedestrian facilities should be life cycle proof and thus suitable for all ages.

---

\(^{12}\) Other terms used for sojourning areas that prioritise sojourning and non-motorised modes are Woonerf, Zone de Rencontre, Verkehrsberuhigung, 30 km/h zones.

\(^{13}\) In the concept of Shared Space and in the Woonerf vehicle traffic is mixed with walkers.

\(^{14}\) ‘Ageing’ means that the the average age of citizens in a population increases; the share of the young people decreases, while the share of the elderly in the population increases.
### Table 5 Pedestrian needs on the Operational Activity Level

<table>
<thead>
<tr>
<th>Operational activity level</th>
<th>quality needs</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeostatic/subsistence needs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| General                    | Convivial / liveable  
  - Shelter from vehicle traffic  
  - Absence of slippery surfaces  
  - Absence of intimidating groups  
  - Road safety  
  - Security  
  - Forgiving environments  
Convenience:  
  - Room to move  
  - Sufficient time to cross  
  - Manageable crossing distances  
  - Predictable waiting times for street crossing  
  - Absence of obstacles  
  - Absence of physical threats  
  - Simple to operate technical interfaces  
  - Traffic calming, interaction zones  
  - Accessibility and usability of vehicles  
  - Effective energy use  
Connected:  
  - Accessibility of public spaces and buildings  
  - Accessible public transport and parked follow-up modes  
Conspicuous:  
  - Notability of walking situations and other public space users  
  - Visibility of all walkers  
Comfort:  
  - Shelter from wind, rain, too much sun  
  - Places where one can get food and drinks  
  - Shelter form sound  
  - Walkable surfaces; no wet feet | SWOV  
Hendriks c.s  
Hendriks et al  
NZTA  
Martincigh  
OECD  
Childstreet  
Childstreet  
SCV (in NL)  
OECD  
VBV |
<table>
<thead>
<tr>
<th>Category</th>
<th>Age Group</th>
<th>Needs</th>
<th>Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological</td>
<td>Elderly</td>
<td>Walking space, Sufficient time to cross &gt; 1.0 m/sec, Large gaps in traffic flow, Minimal slope and stairs, Forgiving surfaces, conditions (no consequences from falls) and vehicle designs (limited consequences from crashes), Simplicity / lack of complexity (interaction doable within given time frames)</td>
<td>VBV, NZTA, PBIC</td>
</tr>
<tr>
<td></td>
<td>Handicapped</td>
<td>Sufficient time to cross &gt; 0.8 m/sec, Large gaps in traffic flow, Minimal slope and stairs, thresholds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performable behavioural rules and norms, Absence of emotional threats, Health = absence of anxiety, stress</td>
<td></td>
</tr>
<tr>
<td>Aesthetic</td>
<td>General</td>
<td>Cleanliness and tidiness (absence of litter, dog excrements, graffiti, no cracks in the pavement), Spatial identity, Open facades, Landmarks, Absence of monotony, Human scale of built environment (absence of overwhelming built environment), Natural features</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Children</td>
<td>Natural features (particularly small animals), Nice colours, Exiting forms</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>General</td>
<td>Kind of supporting through media, Convivial, Convenience, Communication, Feeling of equality</td>
<td></td>
</tr>
<tr>
<td>Public/political</td>
<td>General</td>
<td>Conspicuousness of walkers and sojourners, Protection from traffic conflicts, Acceptable sound levels, Life cycle proof environment (Universal usability)</td>
<td></td>
</tr>
</tbody>
</table>
8. Indicators for existing pedestrian needs

With regard to the identification of needs indicators can help to pinpoint the actual situation for policy making on pedestrian qualities. The most important issue is to know the client: what groups are there and what features set the scene for their needs. A second question is at what activity level is to be policy directed.

With regard to knowledge about the target population, its size and composition are important. Basic indicators in this respect are:

- Number of inhabitants per age group (children, adults, elderly, gender)
- Number of visitors that walk in the area
- (Estimated) number of disabled persons, specified to handicap.
- Number of one-person households
- Distribution of household incomes
- Vehicle ownership
- Mobility (travel motives, number of trips on foot, distances covered, time in traffic)
- Culture regarding walking (public opinion, media statements)
- Group shares

Important features that set the scene for pedestrian needs:

- Climate
- Natural landscape features (share of flat terrain)
- Land use characteristics (attraction points)
- Transportation characteristics (Public Transport availability and accessibility)
- Number
- Time spent sojourning in public space
- Number of casualties, including falls
- Current governmental policies.

9. Conclusion

The main aim of the identification of pedestrian needs is to provide a suitable and convincing ground for stipulating requirements for pedestrian facilities. There appears to be consensus that the most basic general needs of pedestrians are mobility, accessibility, safety and health.

There is however a great variety of pedestrians and, obviously, there is also a great variety in person specific needs. Thus it is not easy to provide a simple and universal picture of pedestrian needs. The question is then, which pedestrian would be the reference standard.

Assuming that policy making and planning targets at providing for the largest possible part of the population, it is most opportune to look at the Greatest Common Devisor and not so much at the Average Pedestrian. In the latter case only half of the population can be served; in the first case a grounds can be provided to serve 90% or more. Asmussen estimates that 30 – 40% of the population has relevant functional limitations. From a survey in the Netherlands it appears that for at least 6 – 9% the limitations are so severe that their mobility is hampered.
It appears that basic characteristics and abilities set the stage for pedestrian needs:

- **Heterogeneity**: almost everyone is or can be a pedestrian.
- The dimensions of a pedestrian: takes approximately 0.5 square meters of space, smaller than any vehicle; a pedestrian takes up somewhat more space when he or she uses walking aids or carries goods.
- The walking average and maximum speed slower than (almost) all other modes.
- The action radius of a pedestrian: less than other modes; the ‘normal’ action radius varies, depending on abilities, between 100 meters and 1,500 meters. However, like true for any mode: the actual action radius depends on the urgency of the need and the reward one gets for going.
- A pedestrian not only walks, but also sojourns in public space.
- A pedestrian is relatively vulnerable.

The degree to which the pedestrian’s needs are satisfied plays a role in their Quality of Life. Pedestrian needs are subjective and vary for ability, age, lifestyle, culture, climate and many more contextual factors. Not everyone has the same needs, and needs can vary over time as well. Some needs are quite explicit and other are somewhat or totally hidden. This great variety will not make it easy to develop an effective and efficient strategy for the support and improvement of walking and sojournning. There are however some basic principles, similarities and common features that gives us something to go on.

Lapintie (2008, 2010) classified needs according to their scope for pedestrian existence. The most basic scope relates to human existence, survival and forgivingness of the environment when something goes wrong. Basic pedestrian needs are Mobility, Accessibility, Safety, Health and Sustainability, which can also be worded as Conviviality, Convenience, Connectedness, Conspicuousness and Comfort (5C’s; Gardner cs., 1996). A somewhat wider scope refers to psychological needs to feel at ease, to belong, to be respected and autonomous, living a satisfying and meaningful life. As next level scopes he distinguishes aesthetic needs, social needs and public/political needs. Aesthetic needs refer to the preference for well-designed and well kept products, which help to feel at ease and orientate. Social needs relate to the necessity of communication with other social groups, and cooperation and segregation. The widest scope constitutes public/political needs. These types of needs concern matters that people feel that they have a right to or behaviour that they are entitled to. Basic in this respect are freedom to use public space, mobility supported by adequate facilities, equal treatment and protection against threats. Public/political needs are to some extent codified in legislation and in guidelines, but can also be non-codified political statements or supported opinions in the media. The European Charter of Pedestrian’s Rights and National traffic, transport and public space use legislation, give most foothold in this respect.

The same basic needs can have different appearances on the four optional activity levels: lifestyle, strategic, tactical and operational activity levels. At the lifestyle activity level preconditions for walking and sojournning are created and pedestrian needs roughly equal human mobility needs. Information, proximity of relevant destinations and the 5 C’s of geographical conditions and the network for walking, to feel at home, independence, social activities, free use of public space and equity are the dominant pedestrian needs.

On the strategic activity the same needs apply, but they are more concretely directed at temporary conditions. There is a difference in needs between daily trips and new and incidental trips to unfamiliar grounds. For the latter certainty about conditions under way is a relevant need. Aesthetics play a role in choices.
Needs on the tactical activity level concern do-ability of route choices, orientation, concentration on the walking task etc. and do not differ much from needs on the strategic activity level. Conspicuousness is more important than at the strategic activity level.

Operational activity level needs touch dealing with concrete situations. The 5 C’s again are dominant general needs. Apart from that skills to cope with the actual conditions matter most. Forgiveness of conditions is a crucial need, particularly in complex and dangerous situations. Convenience bears upon functionality, feasibility and suitability of situations for the task performance in specific circumstances. Free and unobstructed use of public space, shielding from motorised traffic, adequate walking facilities and security are especially important needs for vulnerable groups like children, women at night, the elderly and disabled persons.

References


B.5.5. Identification of quality needs


**Pedestrian Quality Audits and Inspections – more than a part of the new EU-Directive on Road Safety Infrastructure Management**

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‘One step at a time is good walking – or: We do not walk on our legs, but on our will.’  
Chinese and German Proverb

**Summary**

The Pedestrian Quality Inspection is one of the developments of COST 358. It describes a systematic, on site review of the existing situation concerning the performance of requirements to identify hazardous conditions, faults and deficiencies that may lead to less pedestrian demand, worse pedestrian conditions or serious accidents. With regard to the Directive 2008/96/EC of the European Parliament on road infrastructure safety management this new instrument base on developments on Road Safety Inspections and Audits (e.g. PIARC RSA and RSI guidelines) and especially Pedestrian Audits, which, concerning the methods, are available in several countries like Germany, USA or New Zealand. But it goes beyond and it can be seen as a management tool that can be implemented as part of an overall quality management process. Its aim is to identify potential problems so countermeasures can be applied to increase quality, safety and security and therefore to increase pedestrians performance and demand. It contains, in addition to existing inspection and audit instruments, many other aspects, especially in terms of the traffic flow and the quality and climate of walking.

**1. Introduction**

One task of COST 358 with regard to the formulation of the intended state of the pedestrian quality system is to assess what is required to satisfy the pedestrians' needs and wants, relative to their importance, tasks to be performed, competences and abilities. Requirements also refer to opportunities that pedestrians have or get to satisfy their needs. A connected question is what quality determinants and requirements are. What alternative options are there to satisfy needs and wants? As such requirements relate to facilities, processes and opportunities that are needed to satisfy the identified needs adequately: what do we need to implement?

A general principle in this regard is that form follows function and function is strongly related to current or intended usage. Thus in this project we do not look for applications of certain designs, facilities or services, but we look for the optimal solutions to facilitate walking and sojournning.
A basic principle is that needs and wants can only be satisfied, if requirements on several levels are met. Following Rumar’s ideas on the orders of problems (Rumar, 2002), three orders of requirements are distinguished:

- **first order requirements**
  These are visible, tangible, concrete requirements with regard to the equipment of pedestrians, contact options of the social environment, design and equipment of public space and the availability, design and equipment of the transportation system. These requirement specifications concern pedestrians, vehicles, the physical environments and elementary operational behaviour of other people (including other road users) in the environment as well as concrete opportunities for pedestrians to perform intended activities. Examples of first order requirements are thus: speed limiting measures, pedestrian crossings, conditions of surface, other designs of roadside elements and also the equipment of roadside elements.

- **second order requirements**
  These requirements are derived from first order requirements and relate to tactical level facilities and services, like network characteristics, traffic rules and enforcement, vehicle regulation and traffic management. These criteria describe the traffic flow. Examples of second order requirements are thus: public transport (relevance and schedule), speed limits, traffic lights, etc.

- **third order requirements**
  Requirements of this order are preconditions for second and first order requirements. They form the fundament, to make sure that the first and second order requirements can be met. These third order requirements concern land use characteristics, modal split, pedestrian quality culture, competences, abilities, education, training, adequate organisational structures, data availability, research and development, strategic planning etc. They contain particularly aspects of the quality and the climate of walking, such as the proper function (connection or sojourn), the feeling of safety or the modal split.

### 2. Walkability Checklist

The structure of orders of requirements is carried over to the structure of the walkability checklist stated below. It concerns aspects of the design of roadside environment as first order requirements, traffic rules and traffic flow as second order requirements and aspects of road-users behaviour as third order requirement.

With regard to specifying requirements not only demands regarding objects, facilities and services matter. Also requirements regarding context, process and procedure need to be specified. Process and procedure requirements relate to who is needed to get things done and what procedures apply to provide adequate opportunities for intended pedestrian behaviour. With regard to the policy process, a rational and effective control cycle is similar to the error-controlled regulation scheme depicted in figure 1.

Preconditions to an effective control cycle are knowledge, tools, money, communication, organisation and available time. This level is considered within the checklist by the conducted assignment of the requirements to the different stakeholders.
As pedestrians’ issues are not yet high on the political agenda, resources for adequate policy development are severely limited. There will probably not be much time available for a thorough specification of requirements on any level. The needed information should be very easy to acquire. The specifications themselves should be very compact, simple and above all attuned to the different stakeholders context, perspective, needs in relations to their competences and implementation options and ‘language’. This presumes profound insight in the stakeholders (formal and felt) responsibilities, their operational working culture and working methods and the margins of their resources.

As such dedicated standard requirements statements should be developed, made available and actively disseminated for the execution focussed stakeholders like local authorities, architects, the police, educators, social workers etc. For national authorities, NGO’s, land use planners, researchers and consultants, who operate on the meta level it should also be made simple and concrete: what can they do to deliver optimal preconditions?

The proper stakeholders and their points of intersection, as a basis for the structure of the walkability checklist, are:

- **Agencies in charge of maintenance** are responsible for the building and maintenance of roads.
- **The police** are responsible for the observation of traffic rules and for a traffic that flows smoothly.
- **City- and traffic planners** transform the superior aims of the policy and the agencies in charge of maintenance into the transport planning process.
- **If existent, tourism** makes demands on sidewalk network, especially concerning the criteria comfort and attractiveness.
- **Associations of handicapped** do not exist in every local authority. Often, associations of people with walking and / or visually impaired mobility exist with different needs.
- **Schools** especially call for safe sidewalks and are an important stakeholder that needs to be considered in the whole life cycle of sidewalks.
- **Transportation companies** long for safe and comfortable connections to bus stops or stations as well as for comfortable and adequate waiting areas.

The following walkability checklist considers a first overview over the stakeholders’ requirements as their requirements are assigned to the features that belong to first, second or third order requirements.
## Walkability checklist

### Design and equipment of roadside environment (1st order requirements)

<table>
<thead>
<tr>
<th>higher-ranking feature</th>
<th>lower-ranking feature</th>
<th>parameter value(s)</th>
<th>Safety</th>
<th>Comfort</th>
<th>Attractiveness</th>
<th>Agency in charge of maintenance</th>
<th>City/traffic planners</th>
<th>Policy</th>
<th>Tourism</th>
<th>Association handicapped</th>
<th>Schools</th>
<th>Transportation companies</th>
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</thead>
<tbody>
<tr>
<td>Design of roadside environment</td>
<td>Design according to the function</td>
<td>alignment</td>
<td>consistent - inconsistent</td>
<td>+</td>
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<tr>
<td></td>
<td>Sidewalk, walkways and walking paths</td>
<td>consistency</td>
<td>consistent – inconsistent width</td>
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<td>+</td>
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<td></td>
<td></td>
<td>use</td>
<td>only by pedestrians – also by cyclists</td>
<td>+</td>
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<td></td>
<td></td>
<td>width</td>
<td>adequate – restricted – undersized</td>
<td>+</td>
<td>+</td>
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<td></td>
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<td>continuity</td>
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<td>Distance between sidewalk and carriageway</td>
<td>type</td>
<td>crossing – subway - bridge</td>
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<td></td>
<td>number</td>
<td>adequate – too little – not available</td>
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<td>+</td>
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<td></td>
<td></td>
<td>condition</td>
<td>flush – with kerbs</td>
<td>+</td>
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<tr>
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<td>Pedestrian crossings</td>
<td>visually handicapped</td>
<td>adequate – restricted – undersized</td>
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<tr>
<td></td>
<td></td>
<td>walking disabilities</td>
<td>sufficiently considered – too little considered – not considered</td>
<td>+</td>
<td>+</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>deaf people</td>
<td>sufficiently considered – too little considered – not considered</td>
<td>+</td>
<td>+</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>children</td>
<td>sufficiently considered – too little considered – not considered</td>
<td>+</td>
<td>+</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>elderly people</td>
<td>sufficiently considered – too little considered – not considered</td>
<td>+</td>
<td>+</td>
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<td></td>
<td></td>
<td>general</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Condition of surface</td>
<td>type</td>
<td>asphaltic - paved</td>
<td>+</td>
<td>+</td>
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<td></td>
<td></td>
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</table>
### B.5.6. Pedestrian Quality Audits

#### Waiting areas

<table>
<thead>
<tr>
<th>level dimensioning</th>
<th>flush – with kerbs sufficiently dimensioned</th>
<th>-</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Optical contrasts</td>
<td>adequate - inadequate</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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</tr>
<tr>
<td>General view (urban development)</td>
<td>little attractive – attractive – very attractive</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
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<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Sojourn quality</td>
<td>high – modest – low – very low</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
</tr>
</tbody>
</table>

#### Equipment of roadside environment

| Planting            | little attractive – attractive – very attractive | + | + | + | + | + | + | + | + | + | + | + |
| Weather protection  | available – not available                    | + | + | + | + | + | + | + | + | + | + | + |
| Lighting            | well – modest - inadequate                   | + | + | + | + | + | + | + | + | + | + | + |
| Signage             | well – modest - inadequate                   | + | + | + | + | + | + | + | + | + | + | + |
| Seating-accommodations | available – not available                  | + | + | + | + | + | + | + | + | + | + | + |

### Traffic flow (2nd order requirements)

<table>
<thead>
<tr>
<th>higher-ranking feature</th>
<th>lower-ranking feature</th>
<th>parameter value(s)</th>
<th>relevance</th>
<th>stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>Maximum allowed speed</td>
<td>traffic calmed area – 20 – 30 – 50 – 60 – 70 km/h</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Speed limiting measures</td>
<td>relevance effectiveness</td>
<td>available – not available effective – moderate effective – ineffective</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Public transport</td>
<td>relevance schedule</td>
<td>available – not available 10 – 15 – 20 – 30 - &gt; 30 minutes</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Traffic lights</td>
<td>acceptance (pedestrians) green periods</td>
<td>available – not available accepted – predominantly accepted – not accepted (red light runner) adequate - inadequate</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
### Quality and climate of walking (3rd order requirements)

<table>
<thead>
<tr>
<th>higher-ranking feature</th>
<th>lower-ranking feature</th>
<th>parameter value(s)</th>
<th>relevance</th>
<th>stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>daylight</td>
<td>secure – moderately secure – unsecure – very unsecure</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
<tr>
<td>Pedestrian Policy/Strategy</td>
<td>darkness</td>
<td>secure – moderately secure – unsecure – very unsecure</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
<tr>
<td></td>
<td>relevance</td>
<td>available – not available</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
<tr>
<td></td>
<td>liability</td>
<td>low – moderate – high – very high</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
<tr>
<td></td>
<td>Influence degree</td>
<td>low – moderate – high – very high</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
<tr>
<td></td>
<td>Available money</td>
<td>low – moderate – high – very high</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
<tr>
<td></td>
<td>noise</td>
<td>little – moderate – loud – very loud</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
<tr>
<td></td>
<td>pollution</td>
<td>little – moderate – polluted – very polluted</td>
<td>+</td>
<td>Safety, Comfort, Attractiveness, Agency in charge of maintenance, Police, City-traffic planners, Policy, Tourism, Association of handicapped, Schools, Transportation companies</td>
</tr>
</tbody>
</table>
3. Pedestrian Quality Needs Inspection

The walkability checklist allows a quick and rough check of the quality of the whole pedestrian system in order to prove whether general requirements are fulfilled. The next step is to go into detail and to check the pedestrian quality needs.

This next step in COST 358 is called a Pedestrian Quality Needs Inspection (PQN INSPECTION). The PQN INSPECTION is one of the developments of COST 358. A PQN INSPECTION is a systematic, on site review, conducted by experts, of the existing situation concerning the performance of requirements to identify hazardous conditions, faults and deficiencies that may lead to less pedestrian demand, worse pedestrian conditions or serious accidents. With regard to the Directive 2008/96/EC of the European Parliament and the Council on road infrastructure, safety management inspections are surveys on the existing infrastructure in operation whether audits are related to infrastructure projects. Taking this into account, the development of COST 358 is more an inspection of the existing situation in the view of pedestrians. On the other hand the instrument could be used for planned projects too. In this case the expression of a PQN AUDIT could be used also.

It is important to note that:

- A PQN INSPECTION is systematic – this means it is both comprehensive and carried out in a methodical way.
- A PQN INSPECTION needs to be carried out by an independent person or team with experience in safety and security work, traffic engineering, pedestrian’s behaviour and/or road design.
- A PQN INSPECTION relates to an existing situation. That could be a city, an area or even a road.
- A PQN INSPECTION is pro-active, trying to increase pedestrian’s qualities and to prevent accidents and incidents through the identification of quality, safety and security deficiencies for remedial action.

A PQN INSPECTION is a management tool that can be implemented as part of an overall quality management process. PQN INSPECTIONs aim is to identify potential problems so countermeasures can be applied to increase quality, safety and security and therefore to increase pedestrians performance and demand. The PQN INSPECTION bases on developments on Road Safety Inspections and Audits (e.g. PIARC RSA and RSI guidelines) and especially Pedestrian Audits, which, concerning the methods, are available in several countries like Germany, USA or New Zealand. But it goes further on and contains in addition many other aspects especially in terms of the 2nd and 3rd order requirements.

The following issues need to be considered as part of the PQN INSPECTION process:

- **Time of inspection** - it is strongly recommended that inspections take place both during the day and at night. This is important so the inspector(s) can focus on issues that are specific to night such as checking if traffic signs and line markings are still visible at night time. An analysis of the lighting along a road or at an intersection should be undertaken to make sure it is suitable for pedestrians.
- **Seasonal variation** - it is also suggested that consideration be given to inspections in different seasons if the seasons are vastly different e.g. snow in winter and very dry and hot conditions in summer.
- **Site specific matters** – if a road includes a school for example, the inspection should take place partly when school children are arriving or leaving the school. Similarly if a road includes a shopping precinct, the inspection should incorporate busy shopping times.
3.1. The PQN INSPECTION Process

A PQN INSPECTION can be instigated as part of the quality management of a city, a municipality, an area or a road. The first decision is to determine the extent of the inspection by defining the area or the start and end points of the inspection. In most cases this can be a road from start to finish (i.e. between well defined major intersections) but it could also be a section of a road, of a reasonable length), a residential area or a whole city. This will be outlined in an agreement between the parties involved in the inspection, usually the authority and the inspection team. The agreement will describe what to inspect, who is paying for what, timelines and deadlines, what the local agency should contribute with and so on.

There are FOUR steps in the PQN INSPECTION process:

**STEP 1** PREPARATORY WORK IN THE OFFICE
**STEP 2** ON SITE FIELD STUDY
**STEP 3** PQN INSPECTION REPORT
**STEP 4** REMEDIAL MEASURES and FOLLOW UP

It should be noted that Step 4 may be considered as two separate processes – the first is the implementation of remedial measures, while the follow up is likely to be some time later to evaluate the impact of the countermeasures.

**Preparatory work in the office**
Background information about the area or the road, the function of the road, the road standard and the traffic volumes which are not only related to the performance of pedestrians should be obtained as a first step. Information from local residents might prove useful and can be obtained through face to face discussions or a questionnaire. The list below provides information about the sort of questions that should be asked and the answers recorded during the preparatory work for a road as an example:

**Area or Road function**
- Describe the function of the area or the road. What kind of area is it and how is it used? Is it a national, regional or a local road?
- Is the road a school bus route?
- What kind of vehicle traffic is in the area or uses this road? Is it long distance or short distance traffic, or maybe there is a mix of different kinds.
- What about heavy vehicle traffic? Is the proportion more or less than other similar roads? Is the road a part of a freight route?
- Do other vulnerable road users, such as scooter riders or cyclists, use the area or the road?

**Traffic and accident situation**
- Determine the traffic volume and the traffic growth during the last five years.
- Determine the types of vehicles that make up the total traffic count - cars, trucks, scooters, motorcycles, buses as well as the relative density of cycles and pedestrians.
- Is there any traffic volume prediction for the road?
- Analyse the accident situation (last three years), especially when pedestrians, children and elderly people are involved.
Road standard
- Describe the road standard in general and how it links with the road function, traffic volume, types of junctions and intersections, speed limits, etc.
- Analyze the speed limits. Are they reasonable for built-up areas, presence of vulnerable road users, especially children, elderly and disabled persons, etc.?

All relevant guidelines and regulations need to be available. The main goal in this step is to get as much relevant information about the road as possible including the roadside environment and intersecting roads if relevant.

If possible, reasonably detailed maps or drawings or video footage should be made available. These should be used as an instrument during the field-study but also as support for presentation of the results of the PQN INSPECTION. One of the most important parts of an inspection is to accurately indicate where particular problems for pedestrians are along the road. The method of identifying different locations has to be determined at an early stage. Examples of different methods are:

1. The coordinates measured by GPS-equipment and registered in a hand-computer.
2. The Control Section Number together with km-posts.
3. A trip meter used during the field-study.
4. The distance or the coordinates measured in the map or the drawing.
5. Easily identified landmarks or reference to video footage.

Method 1 will be most convenient and accurate when the equipment is available. If GPS is not available, it is suggested a combination of the other methods should be used to enhance accuracy. It is important that the system chosen is accurate, as the location will need to be precise when it comes to implementation of countermeasures.

Preparation for the actual on-site part of the inspection is included in this first step. It is suggested at least the following items should be taken along to assist during the inspection:
- safety vest – to be worn during the inspection so inspectors are visible to road users
- hat and sunscreen in hot weather
- safety boots
- tape measure/measuring wheel
- maps
- some form of recording e.g. portable computer, tape recorder and a digital camera
- paper and pencil
- stop watch if you wish to record vehicle speeds, headway gaps and traffic flows
- A handhold speed gun (radar pistol) may be helpful too
- Checklists

Field Study
For a reliable inspection report the inspection should be made on foot where and incorporate both sides of the road and roadsides. The road should be gone through a number of and photographs taken of specific issues.

It is desirable for some sort of warning signage to be placed on the road being inspected and on roads that intersect this road. Signage, if available, should be placed at least 500m before the inspection team in rural areas, and at least 100 metres in urban areas. A temporary lower speed limit could be applied. These measures need to take into account the length of road being inspected and it may be necessary to shift signage from one point to another.
The on-site field study should start with the description of the surrounding:

**Surroundings**
- Describe the surroundings in general – rural, urban or suburban and a description of what surrounds the road - agricultural area, built-up area or a mixture of these?
- If there is a built-up area, describe the type in greater detail, such as an industrial area, shopping area, residential area, etc.
- Make specific notes if there are facilities that generate heavy traffic.
- If the road is in a rural area, are there linear settlements at long distances along the road?

**Traffic and Accident situation**
The inspectors should observe the traffic flow and document traffic incidents which could easily lead to accidents in specific traffic compositions. They could measure the average speed with speed guns or at certain distances with stop watches because the choice of speed is often related to the infrastructure features such as wide cross sections, long sight distances or lack of orientation. Specific activities which generate traffic and the mix of traffic should be noted including the level of activity by vulnerable road users.

PQN INSPECTIONS aim to detect all deficiencies that may cause accidents, could have an influence on the severity of accidents, reduce the security and the feeling of safety and influence the quality and attractiveness for pedestrians. The PQN INSPECTION checklist provided in Appendix 1 will help to detect such deficiencies.

Pedestrians are the most vulnerable road users and their needs require special attention during the on-site field study. In the field of safety potential accidents arising from the interaction of cars and trucks with vulnerable road users are likely in many countries. The inspection needs to consider many potential countermeasures ranging from policies or slowing traffic down to infrastructure treatments such as separation through either a cycle lane along the side of the road or footpath or separate tracks away from the main road could be options. Also the need to cross the road should be taken into account.

**Checklists**
During the PQN INSPECTION, checklists need to be used and completed (see Appendix 1). The process can involve small sections of the road with repeated check lists or several runs along the whole road or an area using a single check list. The length chosen depends on the complexity of the road or the area.

The checklists are quite detailed and consequently there should be a systematic collection of the deficiencies that were found. The filled in checklists themselves need not be added to the PQN INSPECTION Reports. But the summery of the results will be summing up in an investigation form (Appendix 2). In this form the deficiencies are collated under the broad headings from the checklist with locations provided. This document is a way of gathering all of the information onto one form. This form should form part of the PQN INSPECTION Report.

3.2. The PQN INSPECTION Report
The PQN INSPECTION report should be made up of an introduction, three parts and appendices with maps and illustrations as necessary. The **introduction** should include details of the area, the road or section of road being inspected and the composition of the inspection team, date, times and conditions at the times of the inspection. **Part A** should outline the background data obtained during the preparatory work in the office and a
description of the activities undertaken. **Part B** describes the shortcomings or deficiencies which were found and an assessment of these deficiencies. It should contain the completed investigation form and the documentation with pictures. **Part C** should contain proposals for countermeasures, from short to long term.

A typical PQN INSPECTION Report table of contents would be:

- **Introduction** including area or road being inspected
- **Part A.** Data (area or road function, traffic situation, accident situation, road standards, surroundings)
- **Part B.** Investigation form with the deficiencies
- **Part C.** Proposals and options for counter measures – short term (e.g. signage, marking, enforcement), medium term (e.g. policies, speed reductions using traffic calming measures, refuge islands for pedestrians etc) and long term (e.g. strategic walking network, larger investment may be required). A brief cost estimate should be included
- **Appendix** Maps and Illustrations (in order to clarify the results, different kinds of illustrations may be used including photos and sketches of countermeasures, locations need to be specified)

The PQN INSPECTION Report should propose and discuss a range of countermeasures. The effects of the alternative measures should be estimated. A check must also be made whether the proposed measures can cause any negative effects.

Costs for the alternative countermeasures should be estimated and a ranking of remedial measures should be made. There are a number of tools that are available from various countries which would assist in the prioritisation of works and choice of countermeasures.

**Remedial Measures and Follow up**

Although one could argue the actual implementation of remedial measures and an evaluation of their effectiveness some time later does not form part of the formal PQN INSPECTION process, they are important steps. Implementation will depend on available funds and other factors such as the need for land acquisition. Studies can be carried out at a later time to evaluate the effects of the remedial measures. Behaviour studies should be made in the same way and in the same positions as during the investigation. Traffic volumes and speeds should be checked, as well as the traffic environment. It is suggested the follow up involve different people from those who carried out the inspections and recommendation of countermeasures and be some years after the implementation of the remedial action.

**4. Conclusions**

The new EU-Directive has the issue of enhancing road safety in the member states. The Directive requires the establishment and implementation of procedures relating to road safety impact assessments, road safety audits, the management of road network safety and safety inspections. The new instrument of a Pedestrian Quality Inspection is related to this Directive and especially to the instruments of an Audit and an Inspection but it goes further on. The aim is to state out deficiencies which are related to the whole system of the quality for walking. With implementing the new instrument an improvement of the situation for pedestrians and a new design of roads with high qualities for walking are expected.
References


Austroads: Pedsafe Pedestrian Audit, Sydney 2001


Fuss e.V.: Pedestrian Audit, Pedestrian Crossings in green main walking ways in Berlin (orig.: Fußgängerverkehrsaudit, Querungsanlagen im Verlauf der grünen Hauptwege Berlins, Berlin 2009)


Mineta Transportation Institute: How far, by which route, and why? A spatial analysis of pedestrian preference, San José 2007


PIARC World Road Association: Road Safety Audit Guideline, Paris 2007

PIARC World Road Association: Road Safety Inspection Guideline, Paris 2007

PROMPT, How to promote pedestrians traffic in cities, European Commissions 5th framework

Steve Abley – Chartered Transportation Engineering: Walkability Tools Research, Christchurch, 2007


U.S. Department of Transportation: How to develop a pedestrian safety action plan, Washington DC 2008
# Appendix 1: PQN INSPECTION Checklists

## Design and equipment of roadside environment (1st order requirements)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No.</th>
<th>Question</th>
<th>Yes (✓)</th>
<th>No (X)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Function</strong></td>
<td>1</td>
<td>Is the design of the road according to its function and hierarchy in the network?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Is the design of the area according to its function?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Are transitions installed between different functions and road characteristics?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Are there traffic islands and lane shifts at the entrance of the town, village or area and other traffic calming measures inside?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Is stopping sight distance guaranteed along the entire section?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Are there any issues from accident data?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Does the road &quot;communicate&quot; well with the users so that he realizes the situation without any surprises?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Sidewalks, Walkways and Walking Paths</strong></td>
<td>1</td>
<td>Is the width of sidewalks, walkways and walking paths sufficient (min. 1,80m effective and walkable width without obstacles plus min. 0,50m strip between the sidewalk and the carriageway)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Is the sidewalk, walkway or walking path width adequate for the type of use, the edge use and the pedestrian volumes?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Are the sidewalks, walkways and walking paths continuous and the sidewalks on both sides of the road?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Is the sidewalk, walkway or walking path clear from both temporary (e.g. shop signs, shop furniture) and permanent obstructions?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Is the visibility for motorised traffic adequate to see pedestrians and cyclists along the road?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Are the pedestrian ways physically separated from the carriageway by contrasting kerb stones, barriers or greenery?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Will snow storage disrupt pedestrian access or visibility?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Is the walking surface of the sidewalk adequate and well-maintained?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Are measures needed and implemented to direct pedestrians to safe crossing points and pedestrian access ways?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Design and equipment of roadside environment (1st order requirements)

**Area........../ Road between .......... and ............**  
**Date:**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No.</th>
<th>Question</th>
<th>Yes (✓)</th>
<th>No (X)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td>Are the conditions at driveways intersecting sidewalks endangering pedestrians?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Does the number of driveways make the route undesirable for pedestrian travel?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Are there any conflicts between bicycles and pedestrians on sidewalks?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Do parked vehicles obstruct pedestrian sidewalks?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Are detour routes, alternate routes, and temporary pedestrian routes accessible to pedestrians with all abilities (e.g. are stable curb ramps provided)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Are pedestrian facilities adequate in the area surrounding schools (e.g. do sidewalk widths accommodate peak periods of pedestrian traffic)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Are the sidewalks slippery when wet?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 3. Cross section

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Yes (✓)</th>
<th>No (X)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is the cross section appropriate to the function?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Is the surface of the cross section even and free from stumbling edges?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Is there not too much (max 6 %) but sufficient (min 2 %) cross / diagonal fall?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Is stopping sight at intersections and crossings facilities obstructed, for example by safety barriers, plants?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Have the needs of public transport and its users been taken into consideration?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Is a separating contrasting and haptic strip required between sidewalk and cycle path?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Is a separating contrasting strip required between sidewalk and carriageway?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Are there any bottlenecks? If so, are they properly signed?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4. Intersections

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Yes (✓)</th>
<th>No (X)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Are the intersections perpendicular?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Is the right of way clearly recognizable?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Are the movements guided clearly and easily to understand?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Does the ambient lighting present any special requirements?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Is sight obstructed, for example by safety barriers, fences, road equipment, parking areas, traffic signs, landscaping / greenery, bridge abutments, buildings?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristic</td>
<td>No.</td>
<td>Question</td>
<td>Yes (✓)</td>
<td>No (X)</td>
</tr>
<tr>
<td>---------------</td>
<td>-----</td>
<td>--------------------------------------------------------------------------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Are type and design of the intersections suitable for the function and traffic volume of the intersecting roads? (Separate answers for each intersection!)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Is pedestrian/cyclist routing at intersections adapted to the actual conditions and clearly marked and signposted?</td>
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<td>9</td>
<td></td>
<td>Are all legs of an intersection equipped with pedestrian and cycle crossings? If pedestrians are not allowed to cross a leg because of safety reasons, are they clearly directed to a convenient alternative crossing location?</td>
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<td>10</td>
<td></td>
<td>Has right of way been specified and clarified at pedestrian and cycle crossings, in particular for cycle paths that are set back?</td>
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<td>11</td>
<td></td>
<td>Is the transition safely designed if footpaths and cycle paths end on an intersection or road or are directed across the road?</td>
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<td>12</td>
<td></td>
<td>Is there wild and unorganized parking within the intersections?</td>
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<td>13</td>
<td></td>
<td>Are the pedestrian crossings as narrow as possible?</td>
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<tr>
<td>14</td>
<td></td>
<td>Are pedestrian crossings clearly marked?</td>
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<td>15</td>
<td></td>
<td>Is each section equipped with signals (including railway structures)?</td>
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<td>16</td>
<td></td>
<td>Are the crossings for pedestrians provided with double crossings (kerbs of 6cm for blind people and 0 cm for wheel chairs)?</td>
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<td>17</td>
<td></td>
<td>Are the type and spacing of different crossing installations coordinated (e.g. railway crossings, traffic signals, zebra crossings)?</td>
<td></td>
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<td>18</td>
<td></td>
<td>Are refuges large and wide enough for crossing pedestrians and cyclists to stand and wait?</td>
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<tr>
<td>19</td>
<td></td>
<td>Are the islands separated enough from the carriageway?</td>
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<td>20</td>
<td></td>
<td>Are the islands made only by markings?</td>
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<tr>
<td>Roundabouts</td>
<td>21</td>
<td>Has each road access an island?</td>
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<td>Question</td>
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<td>No (X)</td>
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</tr>
<tr>
<td>5. Public and private services, Parking</td>
<td>1</td>
<td>Are there major traffic generators such as city hall, religious sites and cemeteries, hospitals, housing or shopping centres, petrol stations and tourist attractions taking into account?</td>
<td></td>
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<td></td>
<td>2</td>
<td>Are the dimensions of the parking areas sufficient for parking for passenger vehicles, trucks and buses?</td>
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<td></td>
<td>3</td>
<td>Are no-stopping zones provided as necessary?</td>
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<td>4</td>
<td>Is the arrangement of parking (parallel, diagonal or perpendicular) along the road sides safe?</td>
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<td>5</td>
<td>Are parking facilities obstacles for sidewalks?</td>
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<td>6</td>
<td>Are parking facilities obstacles for sight distances (e.g. at pedestrian crossings)?</td>
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<td></td>
<td>7</td>
<td>Are there countermeasures like bollards to prevent illegal parking?</td>
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<td></td>
<td>8</td>
<td>Are loading areas provided next to the road at shops and restaurants?</td>
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<tr>
<td>6. Public transport stops</td>
<td>1</td>
<td>Are public transport stops easily and safe accessible to pedestrians?</td>
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<td></td>
<td>2</td>
<td>Are there safe pedestrian crossing facilities directly situated at public transport stops?</td>
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<td></td>
<td>3</td>
<td>Are the pedestrian crossings in the rear of a stopping public transport system?</td>
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<td>4</td>
<td>Are the stops signposted and detectable by the drivers? Is reconcilability guaranteed?</td>
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<td></td>
<td>5</td>
<td>Are areas for waiting pedestrians large enough and well designed (seats, weather protection, telephone?)</td>
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<td></td>
<td>6</td>
<td>Is sight obstructed, for example by safety barriers, fences, road equipment, parking areas, traffic signs, landscaping / greenery, bridge abutments, buildings?</td>
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<td></td>
<td>7</td>
<td>Is cyclist routing safely designed in the area near public transport stops?</td>
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</table>
### Design and equipment of roadside environment (1st order requirements)

<table>
<thead>
<tr>
<th>Area…………/ Road between …………… and ……………</th>
<th>Date:</th>
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<th>Characteristic</th>
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<th>No (X)</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td>Do pedestrians entering and leaving buses conflict with cars, bicycles, or other pedestrians?</td>
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<td>9</td>
<td></td>
<td>Is lighting required? And if so, is it appropriately designed?</td>
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<td>10</td>
<td></td>
<td>Are shelters appropriately designed and placed for pedestrian safety and convenience?</td>
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<td>11</td>
<td></td>
<td>Is the seating area at a safe and comfortable distance from vehicle and bicycle lanes?</td>
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<td>12</td>
<td></td>
<td>Are public transport stops part of a continuous network of pedestrian facilities?</td>
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<td>13</td>
<td></td>
<td>Are access ways to transit facilities well-lit to accommodate early-morning, late-afternoon, and evening?</td>
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<td>14</td>
<td></td>
<td>For children that take the bus, do sidewalks provide direct access from the bus loading area for the school, without crossing parking lots or traffic lanes?</td>
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<td>15</td>
<td></td>
<td>Will pedestrians waiting at the seating area be splashed by approaching buses during rain/inclement weather?</td>
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<td>16</td>
<td></td>
<td>Are drop-off/pickup lanes separated from bus lanes to minimize confusion and conflicts?</td>
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<td>17</td>
<td></td>
<td>Are there time tables, route maps, maps of the local areas at the public transport stops?</td>
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<td>18</td>
<td></td>
<td>Is there an electronic display with actual service arriving times at the public transport stop?</td>
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### 7. Pedestrian Crossings

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<tr>
<td>1</td>
<td>Are the pedestrian crossings located where required by pedestrians?</td>
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<tr>
<td>2</td>
<td>Is there a risk of pedestrian underpasses and bridges being bypassed on high speed roads? Are suitable measures in place?</td>
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<td>3</td>
<td>Are further crossing aids (e.g. lollipop men) required?</td>
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<tr>
<td>4</td>
<td>Are areas for waiting pedestrians and cyclists sufficient?</td>
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<tr>
<td>5</td>
<td>Are refuges large and wide enough for crossing pedestrians and cyclists to stand and wait?</td>
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<tr>
<td>6</td>
<td>Are crossings over special railway structures of a safe design?</td>
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</table>
### Design and equipment of roadside environment (1st order requirements)

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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area.........../ Road between ............ and ............</td>
<td>7</td>
<td>Is two-way visual contact ensured between pedestrians and motorists in sufficient stopping distances?</td>
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<td></td>
<td>8</td>
<td>Has priority been given to pedestrians and cyclists over other traffic where necessary?</td>
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<td></td>
<td>9</td>
<td>Are parked vehicles obstructing the visibility of the road users regarding cyclists?</td>
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<td></td>
<td>10</td>
<td>Are the pedestrian crossings signposted and detectable by the drivers?</td>
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<td></td>
<td>11</td>
<td>Are islands clearly visible and properly placed?</td>
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<td></td>
<td>12</td>
<td>Is lighting provided at crossings in an adequate way?</td>
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<td></td>
<td>13</td>
<td>Do wide curb radii lengthen pedestrian crossing distances and encourage high-speed right turns?</td>
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<td></td>
<td>14</td>
<td>Are separate and unsignalized right turn lanes avoided and does the kind of right turn minimize conflicts with pedestrians?</td>
<td></td>
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<td></td>
<td>15</td>
<td>Does a skewed intersection direct drivers’ focus away from crossing pedestrians?</td>
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<td></td>
<td>16</td>
<td>Are marked crosswalks wide enough?</td>
<td></td>
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<td></td>
<td>17</td>
<td>Are corners and curb ramps appropriately planned and designed at each approach to the crossing?</td>
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<td></td>
<td>18</td>
<td>Are driveways placed close to crossings and may that cause problems?</td>
<td></td>
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<td></td>
<td>19</td>
<td>Do pedestrians cross at uncontrolled locations because marked or controlled crossings are dangerous, inconvenient, or not placed appropriately?</td>
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<td></td>
<td>20</td>
<td>Are crossings in school zones marked as school crossings?</td>
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<td></td>
<td>21</td>
<td>Are there reflectors along the pedestrian crossing?</td>
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</tbody>
</table>

### 8. Signing, Marking, Lighting

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No.</th>
<th>Question</th>
<th>Yes (✓)</th>
<th>No (X)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Is sight obstructed by signs?</td>
<td></td>
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<td></td>
<td>2</td>
<td>Can the signs be clearly recognized and read (size of signs)? And do the signs conform to the conventions of Vienna and Geneva?</td>
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<td></td>
<td>3</td>
<td>Are there more than 2 different traffic signs at one place and are all traffic signs necessary?</td>
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<tr>
<td>Characteristic</td>
<td>No.</td>
<td>Question</td>
<td>Yes (✓)</td>
<td>No (X)</td>
<td>Comments</td>
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<td>4</td>
<td></td>
<td>Is signing and marking logical and consistent? Does it show the right of way clearly?</td>
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<tr>
<td>5</td>
<td></td>
<td>Is pedestrian and cyclist routing at intersections adapted to the actual conditions and clearly signposted?</td>
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<tr>
<td>6</td>
<td></td>
<td>Are the installations shared by pedestrians and cyclists, including underpasses and bridges, properly signposted?</td>
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<td>7</td>
<td></td>
<td>Are advanced warnings in place for features that cannot be seen in time? Are there warning signs, such as “School Bus Stop Ahead” or Pedestrian Warning Signs which advise motorists of the presence of pedestrians where needed?</td>
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<tr>
<td>8</td>
<td></td>
<td>Could greenery lead to safety or security problems if the vegetation grows (e.g. as a result of covered road signs)?</td>
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<td>9</td>
<td></td>
<td>Are signs located in such a way as to avoid restricting visibility from approaches or intersecting roads?</td>
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<td>10</td>
<td></td>
<td>Are signs retro reflecting or are they illuminated at night? In daylight and darkness, are signs satisfactory regarding visibility?</td>
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<tr>
<td>11</td>
<td></td>
<td>Do signs convey a simple and clear meaning?</td>
<td></td>
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<tr>
<td>12</td>
<td></td>
<td>Is pedestrian signing near schools adequate and effective?</td>
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<td>13</td>
<td></td>
<td>Do all signs and markings correspond without any contradictions?</td>
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<td>14</td>
<td></td>
<td>Are the road markings clear and recognizable?</td>
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<td>15</td>
<td></td>
<td>Have old markings/signs been completely removed (phantom markings)?</td>
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<tr>
<td>16</td>
<td></td>
<td>Are the markings likely to be effective under all expected conditions (day, night, wet, dry, fog, rising and setting sun)?</td>
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<td>17</td>
<td></td>
<td>Are the markings according to the pedestrian and cyclist traffic flow?</td>
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<tr>
<td>18</td>
<td></td>
<td>Is the obligation to yield right of way enforced by markings according to the one enforced by signing?</td>
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<tr>
<td>19</td>
<td></td>
<td>Are pedestrian travel zones clearly delineated from other modes of traffic through the use of striping, coloured and/or textured pavement, signing, and other methods?</td>
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</tbody>
</table>
### Design and equipment of roadside environment (1st order requirements)

**Area………../ Road between …………… and …………… Date:**

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<th>Characteristic</th>
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<th>Question</th>
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<th>Comments</th>
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<tr>
<td></td>
<td>20</td>
<td>Is the road sufficiently illuminated?</td>
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<td></td>
<td>21</td>
<td>Is the stationary lighting appropriate?</td>
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<td></td>
<td>22</td>
<td>Is the lighting of special situations (pedestrian crossings, changes in cross section) suitably designed?</td>
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<td></td>
<td>23</td>
<td>Do remaining unlit areas present potential problems?</td>
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<td></td>
<td>24</td>
<td>Does the existing road lighting lead to conflicts in recognizing the yellow indication (sodium discharge lamps)?</td>
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<td></td>
<td>25</td>
<td>Does lighting need to be changed so that crossing pedestrians are clearly visible?</td>
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<td></td>
<td>26</td>
<td>Is contrast lighting required at the intersection?</td>
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<td></td>
<td>27</td>
<td>Does the ambient lighting present any special requirements?</td>
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<td>28</td>
<td>Can the stationary lighting cause problems in recognizing the traffic signs or the alignment of the road?</td>
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<tr>
<td></td>
<td>29</td>
<td>Are the lighting masts situated outside of walkable width needed (min. 1,80m)?</td>
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<td>In the areas where is no stationary lighting, are there any potential dangers?</td>
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<td></td>
<td>31</td>
<td>Are there guide signs which provide directional and location information to pedestrians?</td>
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#### 9. Plantings

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<td>1</td>
<td>Is there any vegetation along the road?</td>
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<tr>
<td>2</td>
<td>Does it obstruct the visibility on the traffic signs or the intersections and pedestrian crossings?</td>
</tr>
<tr>
<td>3</td>
<td>Does the greenery and type of planting preclude irritations to the road users?</td>
</tr>
<tr>
<td>4</td>
<td>Does the greenery or will the growth of greenery lead to future safety or security problems?</td>
</tr>
<tr>
<td>5</td>
<td>Is visual contact motorist-pedestrian-cyclist restricted by greenery?</td>
</tr>
<tr>
<td>6</td>
<td>Is the vegetation along the road old and could lead to safety problems?</td>
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#### 10. Barrier free design

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<td>1</td>
<td>Are special features required for children?</td>
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<td>2</td>
<td>Are special features required for elderly people?</td>
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<td>19</td>
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<td>20</td>
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<tr>
<td>Characteristic</td>
<td>No.</td>
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<td>-----------------------------</td>
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</tr>
<tr>
<td>1.  Speed and Traffic Volumes</td>
<td>1</td>
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<tr>
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<tr>
<td>2.  Public Transport</td>
<td>1</td>
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<td>5</td>
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<tr>
<td>3.  Traffic Lights</td>
<td>1</td>
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<td>3</td>
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<td>6</td>
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</tbody>
</table>
## Traffic flow (2nd order requirements)

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Is the green time for pedestrian crossing sufficient?</td>
</tr>
<tr>
<td>8</td>
<td>If there is no exclusive pedestrian phase, is a leading pedestrian interval provided?</td>
</tr>
<tr>
<td>9</td>
<td>Are phase offsets required for pedestrians and cyclists within the cycle?</td>
</tr>
<tr>
<td>10</td>
<td>Are separate signals provided for cyclists? (Are the signal aspects correctly located for the cyclists? Estimate clearance times for cyclists? Avoid protected turn phases/risk of cyclists crossing on red.)</td>
</tr>
<tr>
<td>11</td>
<td>Are the type and spacing of different crossing installations coordinated (e.g. railway crossings, traffic signals, zebra crossings)?</td>
</tr>
<tr>
<td>12</td>
<td>Are the signals affected at dawn/dusk by direct sunlight?</td>
</tr>
<tr>
<td>13</td>
<td>Are advanced warnings provided for traffic signals that cannot be seen in time?</td>
</tr>
<tr>
<td>14</td>
<td>Have the locations for the signals been selected correctly so that there are no obstacles?</td>
</tr>
<tr>
<td>15</td>
<td>Is the waiting time for pedestrian’s green light not too high (max. 40-60 sec.)?</td>
</tr>
<tr>
<td>16</td>
<td>Does the existing road lighting lead to conflicts in recognizing the yellow indication (sodium discharge lamps)?</td>
</tr>
<tr>
<td>17</td>
<td>Are the traffic signals properly situated so that they can be distinguished by each particular traffic flow?</td>
</tr>
<tr>
<td>18</td>
<td>Is the visibility of the traffic signals ensured on a sunny day?</td>
</tr>
<tr>
<td>19</td>
<td>Are signals covered/obstructed (e.g. by traffic signs, lighting masts, plants, traffic jams)?</td>
</tr>
<tr>
<td>20</td>
<td>Is there a problem because of an inconsistency in pedestrian actuation (or detection) types?</td>
</tr>
<tr>
<td>21</td>
<td>Are all pedestrian signals and push buttons functioning correctly and safely?</td>
</tr>
<tr>
<td>22</td>
<td>Are ADA accessible push buttons provided and properly located?</td>
</tr>
<tr>
<td>23</td>
<td>Is sufficient timing provided to allow pedestrians and turning vehicles to clear the intersection?</td>
</tr>
</tbody>
</table>
### Quality and climate of walking (3rd order requirements)

Area:…………./ Road between …………. and …………..

**Date:**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No.</th>
<th>Question</th>
<th>Yes (√) No (X)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Security</td>
<td>1</td>
<td>Altogether, does the spatial structure seem transparent and open?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Are important primary spatial axes and sight relations kept recognizable and free?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Is the edge use orientated to the public sphere of traffic?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Do the building structures make social control possible to the sphere of pedestrian traffic and do they convey this impression?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Are lobbies, gateways and stairs openly, brightly and well understandable?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Do green spaces and location areas in sight and ear shot lie to buildings and other areas frequented?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Do car parks in sight and ear shot lie to other frequented areas?</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>8</td>
<td>Do firm fittings or plantings hinder view relations?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Is the lighting concept coordinated to pedestrian and location areas?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Are there at any time critical (too high or too low) pedestrian traffic densities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Are the location and rest areas sufficiently and clearly structured?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Are safe and secure alternatives to the use of narrow or badly open underpasses and stairs offered to pedestrians?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>Are footpaths within parks openly and visible?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Are car parks accessible well on foot?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Are the speeds of vehicles so low that social control can be expected?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Do I find subjectively felt fear spaces? Are there any blind corners or points of limited visibility?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Do sufficient alternatives stand me to the avoidance of bottlenecks, dark spaces and badly open areas at the disposal?</td>
<td></td>
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<tr>
<td></td>
<td>18</td>
<td>Are sufficient and suitable chances to escape at my disposal in the need?</td>
<td></td>
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<tr>
<td></td>
<td>19</td>
<td>Do I have the feeling to be protected from theft, encroachments and vandalism?</td>
<td></td>
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<tr>
<td></td>
<td>20</td>
<td>Do favourable conditions for criminal offences pass persons and things due to the spatial structure and space utilisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality and climate of walking (3rd order requirements)</td>
<td>Date:</td>
<td></td>
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<tr>
<td>Area................................./ Road between .................. and ..................</td>
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<tr>
<td>opposite?</td>
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<tr>
<td>21 Were there criminal offences in the past?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>22 Is the criminal rate over average or are there any distinctive features concerning crime in the past?</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>23 Is there a good presence of the police so that I can feel being protected?</td>
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</tbody>
</table>

2. General Climate, behaviour and Performance

<table>
<thead>
<tr>
<th>Question</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Are pedestrian facilities continuous? Do they provide adequate connections for pedestrian traffic?</td>
<td></td>
</tr>
<tr>
<td>2 Does pedestrian network connectivity continue through crossings by means of adequate, waiting areas at corners, curb ramps and marked crosswalks?</td>
<td></td>
</tr>
<tr>
<td>3 Do pedestrians have the right of way by crossing the roads?</td>
<td></td>
</tr>
<tr>
<td>4 Do sidewalks/paths connect the street and adjacent land uses in an appropriate way?</td>
<td></td>
</tr>
<tr>
<td>5 Are buildings entrances located and designed to be obvious and easily accessible to pedestrians?</td>
<td></td>
</tr>
<tr>
<td>6 Do drivers generally are careful, look for and yield to pedestrian?</td>
<td></td>
</tr>
<tr>
<td>7 Does pedestrian or driver behaviour increase the risk of a pedestrian collision?</td>
<td></td>
</tr>
<tr>
<td>8 Do pedestrians or motorists regularly misuse or ignore the pedestrian facilities?</td>
<td></td>
</tr>
<tr>
<td>9 Are there many obstructions that would prevent a driver from seeing a child at and approaching intersections and driveways?</td>
<td></td>
</tr>
<tr>
<td>10 How are facilities perceived by young children and elderly people?</td>
<td></td>
</tr>
<tr>
<td>11 Are school gates appropriately located to provide convenient and direct access for pedestrians?</td>
<td></td>
</tr>
<tr>
<td>12 Is an adequate level of weather protection required?</td>
<td></td>
</tr>
<tr>
<td>13 Is there enough service equipment and comfort features like public toilets, drinking fountains, shelter, seats, rubbish bins, public phone boots, shady trees, bank ATM machines?</td>
<td></td>
</tr>
<tr>
<td>14 Is the service equipment and comfort feature well designed and maintained?</td>
<td></td>
</tr>
<tr>
<td>15 Is there any kind of smell (e.g. pollution, factory fumes) which disturbs the attractiveness for pedestrian use?</td>
<td></td>
</tr>
<tr>
<td>16 Does the amount of litter disturb the attractiveness for pedestrian use?</td>
<td></td>
</tr>
</tbody>
</table>
## Quality and climate of walking (3rd order requirements)

### Road between .......... and ...........

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Does the amount of detritus organic waste such as leaves, gravel, bark chips disturb the attractiveness for pedestrian use?</td>
</tr>
<tr>
<td>17</td>
<td>Does the amount of vandalism, tagging or broken items disturb the attractiveness for pedestrian use?</td>
</tr>
<tr>
<td>18</td>
<td>Are recreational parks reachable in short walking distances (maximum 10 to 15 minutes)?</td>
</tr>
<tr>
<td>19</td>
<td>Are grass verges adjacent the footpath, large planter boxes, small reserves, residential front lawns (without fences) or large landscaped garden areas included within the streetscape design?</td>
</tr>
<tr>
<td>20</td>
<td>Is the design effort relates to physical items that make the streetscape look nice adequate and more than just functional?</td>
</tr>
<tr>
<td>21</td>
<td>Are there gardens, cobblestones, seating, art, water features and other comparable items integrated?</td>
</tr>
<tr>
<td>22</td>
<td>Do adequate drinking-and-driving laws exist?</td>
</tr>
<tr>
<td>23</td>
<td>Are measures for monitoring walking and walking climate in use?</td>
</tr>
</tbody>
</table>

### 3. Pedestrian Policy and Strategy

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is a National investment program in walking facilities available?</td>
</tr>
<tr>
<td>2</td>
<td>Is a Regional and/or Municipal investment program in walking facilities available?</td>
</tr>
<tr>
<td>3</td>
<td>Is a system for monitoring progress toward the walking goals and desired outcomes available?</td>
</tr>
<tr>
<td>4</td>
<td>Is there a decision making environment that supports effective action for walking?</td>
</tr>
<tr>
<td>5</td>
<td>Is there an information centre which gathers and manages information on walking?</td>
</tr>
<tr>
<td>6</td>
<td>Is a Strategic Walking Network defined?</td>
</tr>
<tr>
<td>7</td>
<td>Are their campaigns for promoting walking? Are walking information services and websites available?</td>
</tr>
<tr>
<td>8</td>
<td>Are local volunteer user group networks able to build local support for walking?</td>
</tr>
<tr>
<td>9</td>
<td>Do pedestrian training programs exist?</td>
</tr>
<tr>
<td>10</td>
<td>Do land use support short distances (e.g. rules for minimal/maximal urban density, in peripheral areas, for new neighbourhoods)?</td>
</tr>
<tr>
<td>11</td>
<td>Is the pedestrian demand assessed and monitored?</td>
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</tbody>
</table>
### Quality and climate of walking (3rd order requirements)

<table>
<thead>
<tr>
<th>Area........../ Road between .......... and ............</th>
<th>Date:</th>
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</thead>
<tbody>
<tr>
<td>12 Is there routing information on internet available?</td>
<td></td>
</tr>
<tr>
<td>13 Can routing information be used by PDA and GPS?</td>
<td></td>
</tr>
<tr>
<td>14 Are walking experiences like guided walks offered?</td>
<td></td>
</tr>
<tr>
<td>15 Is publicity used to promote walking and to inform stakeholders about issues and walking events through newspapers, radio, TV and videos, billboards, posters, direct mail, or flyers?</td>
<td></td>
</tr>
<tr>
<td>16 Are pedestrian improvements included in all projects, programs and maintenance activities?</td>
<td></td>
</tr>
<tr>
<td>17 Are funds dedicated to pedestrian qualities and are they sufficient?</td>
<td></td>
</tr>
<tr>
<td>18 Does the public has the chance to give hints about pedestrian infrastructure lacks or deficiencies in an appropriate way (e.g. via internet) and to follow the state of repair?</td>
<td></td>
</tr>
<tr>
<td>19 Are quantitative targets (annual target for accident reduction, mobility target, etc.) available?</td>
<td></td>
</tr>
<tr>
<td>20 Is the protection of pedestrians ruled in an adequate way (e.g. profiling of vehicle front, reduction of aggressiveness, front protection in crashes against pedestrians, shock absorbers, side protections in crashes against vulnerable road users)?</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Walking friendly environment

| 1 Is the environment interesting and attractive? |       |
| 2 Are there front gardens, green elements, benches? |       |
| 3 Has the environment an identity of its own? |       |
| 4 Are there possibilities for individuals to personalise spaces like temporary exhibitions in public space of art and/or goods and spaces that can be used in many ways? |       |
| 5 Does the environment invite for recreation? |       |
| 6 Could children play safe in spaces? |       |
| 7 Are the buildings attractive and maintained? |       |
| 8 Does noise disturb walking? |       |
| 9 Does pollution disturb walking? |       |
### Appendix 2: Investigation form for deficiencies

| Results of a PQN INSPECTION in the Area............../  
| Road between ............ and ..............  
| Inspector .................................  
| Date/Time............................... |

<table>
<thead>
<tr>
<th>Design and equipment of roadside environment (1st order requirements)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Traffic flow (2nd order requirements)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality and climate of walking (3rd order requirements)</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>
Assessing the importance of needs and requirements

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‘When I observe that there are different ways of surveying, my employer commonly asks which will give him the most land, not which is most correct.’
Henry D. Thoreau

Summary

This paper deals with the task of finding out an assessment method to rank the importance of the gathered needs in the framework of PQN project.

A limited literature review has shown the existence of several criteria that may help in this task.

The most important of these methods, which fit into the characteristics of this project, are explained as a base for discussion among the PQN project consortium.

Finally, a multiple criteria method for measuring the importance of needs is proposed as recommended method.

1. Introduction

An image of intended state through a system approach to Pedestrian Quality Needs (or the qualities which pedestrian need) will follow from:
1. The identification of relevant Needs.
2. The identification of requirements regarding the pedestrian’s environment (standards?)
3. A classification according to the importance of them (as step towards identifying the “ideal” pedestrian environment).

There is simply not enough time or budget to meet every end user need. A procedure of assessment of importance of qualities must be undertaken.

1 Life without Principle (1863)
The idea of importance conveys a meaning of perspective. Hence, the identified quality needs may be selected and ranked under some different criteria. In this paper some findings on this issue will be presented.

2. Assessment from the Bradshaw’s typology (1972) point of view.

Bradshaw (1972) proposes a classification in four types of needs: Normative need, Felt need, Expresed need and Comparative need:

Normative needs tends to be professionally defined and have a knowledge base. A desirable standard is set by professionals, policy makers or social scientists, against which the actual condition is compared. Those below the standard are said to be in need of support and special services. A good example is the intelligent quotient (IQ) which is used to indicate people with special needs (below a score of 80 is defined as moderately retarded). Social security entitlement is also normatively defined. People’s needs are measured against their assets. Only if the asset value is below a set amount, which is defined by policy makers, then eligibility to improve results. Indeed the setting of the standard is not value-free, it is relative to the socio-political and economic situations, and may change from time to time.

A felt need is equated to what people want. It can be defined easily by asking service users or potential users what they wish to have. Hence, a felt need can be inflated by users’ reference to their own high expectation (for example, a housing unit reaching a good private market standard). A felt need can be deflated by the potential users’ ignorance or rejection of services (for example, in some cultures there is a poor understanding of a personal counselling service and so they reject it).

An expressed need is generally taken as equivalent to demand, as the unmet need. The notion is that one does not make a demand unless one feels the need. However, considering that people requiring social services are often those with fewer resources and education, they do not often voice their demands. Sometimes, well-justified collective demands, such as that for industrial safety, could easily be taken as political activity against the governments; hence, there is some reluctance for these needs to be expressed. Policy makers normally take it that ‘no demand’ means ‘no need’. There are also cultural reasons as to why a need is not expressed (for example, wife and child abuse are believed to be fairly serious in several countries in the region, and yet, they have been taken as just within a family’s business). Policy makers and professionals should be mindful that Asian families are likely to experience the same variety of problems as developed countries in the future.

A Comparative need is measured by reference to a user already receiving the service in question. Therefore, a person is in comparative need if he or she has the same or worse characteristics as someone receiving the service. The concept also can be applied to districts (for example, district A provides free medical treatment while district B does not) or to countries. However, this method of comparison leaves two questions unanswered as only existing services are being compared. “What if there is a need for a new service?” “Does it also imply that the reference standard is faultless and no longer needs improvement?”

In order to the assessment each one of the list of identified quality needs is given a plus sign (presence of need) or a minus sign (absence of need) for each one of the four needs proposed by Bradshaw. The taxonomy gives rise to 12 possible combinations (i.e.: ++++, ---, -, ++--) The presence of all types of needs is equated to real need.

2 A ‘need’ can be both an abstract functional need (like being fed, protection, happiness, knowledge), or an concrete requirement regarding the pedestrian’s environment.
### B.5.7. Assessing the importance of needs and requirements

<table>
<thead>
<tr>
<th>Quality need identified</th>
<th>Valuation</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>++++</td>
<td>Real need (all 4 conditions are met)</td>
</tr>
<tr>
<td>B</td>
<td>- - - -</td>
<td>No need at all (none conditions are met)</td>
</tr>
<tr>
<td>C</td>
<td>++ - -</td>
<td>There is no expressed need leaving the Normative one without backing. Also comparative need is lacking what leaves us without references.</td>
</tr>
</tbody>
</table>

Bradshaw’s approach to ‘need’ is a useful framework for policy making and for analysing policy to the extent that political, economic and social factors can be taken in account in deciding needs and services. However, it does not provide a clear guide as to how needs can be assessed at operational levels.

### 3. Assessment from the Hierarchy of Walking Needs point of view, (M.A. Alfonzo, 2005)

Also the Pyramid of needs of pedestrians (Van Hagen, 2006) may be used in this assessment procedure, which even being restricted to the context of urban space, it results quite illustrative, and so, its use can be extended.

Within the model, a hierarchy of walking needs operates and organizes five levels of needs hierarchically and presents them as antecedents within the walking decision-making process. This model can (a) serve as a framework by which to understand the relative significance of the cornucopia (viz, abundance) of variables identified by existing research, (b) offer hypotheses for how these factors affect peoples’ decision to walk, and (c) help to guide future research and practice.

The hierarchy of walking needs model alone does not explain the entire walking decision-making process. Rather, the hierarchy must be placed within the context of a social-ecological framework to fully understand how people make the decision to walk. The hierarchy of walking needs organizes the various urban form variables identified to be significant by existing research into a hierarchy of pre-potency. Thus, some urban form variables are more fundamental (or necessary) within the decision-making process. It also incorporates feasibility, a nonurban form variable, as the most basic need, for which fulfilment is necessary to even consider urban form within the decision to walk. The elements within the hierarchy serve as the antecedents within the walking decision-making process. These variables are either present or absent within the setting (or within the person in the case of feasibility) in which the decision to walk occurs. It is the opportunity to fulfil these needs, however, that ultimately may affect the decision to walk. As applied to walking behaviour, people may differ with respect to the opportunity they perceive. Individual, group, and cultural factors may all moderate the relationship between the hierarchy of walking needs and a person’s decision to walk.

The model hypothesizes on the most effective targets for change. For example, if a community lacks the necessary features to fulfil residents’ safety, comfort, and pleasurability needs, safety features would be identified as the leverage point. Addressing higher-order needs without first satisfying lower-order needs may be less effective for increasing walking

Leverage points (whoever who feels responsible to) become particularly important to community programs and policy recommendations when one recognizes that resources are typically limited and not all interventions can be funded.
B.5. Policy process

Figure 1 Hierarchy of needs according to Alfonzo, 2005

Includes factors such as:
- Diversity and complexity
- Livelihoods (activity level)
- Architectural coherence and scale
- Aesthetic appeal
May be operationalized as:
- Presence of a varied streetscape, mixed uses, architectural elements, historic or unique architecture, color, etc.
- Presence of public space
- Presence of other people, street vendors, outdoor dining areas, etc.

Includes factors such as:
- Urban design characteristics that affect the relationship between pedestrians and motorized traffic
- Urban design characteristics related to the pedestrian walkway system and street network
- Urban design amenities
May be operationalized as:
- Presence of traffic calming elements (e.g., roundabouts, medians, curb bulb-outs, etc.)
- Width of the street, length of blocks, width of sidewalk, presence of sidewalk buffer, street trees, etc.
- Street furniture, arcades, canopies, water fountains, etc.

Figure 2 Pyramid of needs of pedestrians after Van Hagen (2006)

Includes factors such as:
- Urban design characteristics related to physical incivilities and fear of crime
- Types of land uses
- People present
May be operationalized as:
- Presence of graffiti, litter, abandoned buildings, broken windows, etc.
- Presence of bars, shops, lounges, pavers, etc.
- Presence of homelessness or living individuals, etc.

Includes factors such as:
- The pattern, quantity, quality, variety, and proximity of activities present
- Connectivity between uses
- Walking-related infrastructure
May be operationalized as:
- Presence/completeness of sidewalk network
- Presence/number of barriers
- Distance to destinations
- Number of destinations, etc.

Figure 1

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4. Assessment based on the Demand on the Physical Environment

A way to do that may be found in Jan Gehl, a Danish architect, who simplifies and divides outdoor activities in public spaces in a city into three categories, each of which places very different demands on the physical environment: necessary activities, optional activities, and social activities.


**Necessary activities**, such as going to school or work, delivering mail, and shopping—will happen all year round, no matter what. A hostile urban environment might make a trip to the grocery store less fun, but it will not stop people from buying food.

**Optional activities** depend to a significant degree on what the place has to offer and how it makes people behave and feel about it. The better a place, the more optional activity occurs and the longer necessary activity lasts. An example: taking a walk to get a breath of fresh air, standing around enjoying life, or sitting and sunbathing".

**Social activities**, all activities that depend on the presence of others will necessarily decrease as well include children's play, greetings and conversations, communal activities of various kinds, and simply seeing and hearing other people. When city residents see no reason to linger outside, they will rarely engage in such activities as standing around enjoying life.

While necessary activities take place regardless of the quality of the physical environment, optional activities Social activity is the fruit of the quality and length of the other types of activities, because it occurs spontaneously when people meet in a particular place. Communal spaces in cities and residential areas become meaningful and attractive when all activities of all types occur in combination and feed off each other.

This connection is important in relation to physical planning. Although the physical framework does not have a direct influence on the quality, content, and intensity of social contacts, architects and planners can affect the possibilities for meeting, seeing, and hearing people. As a result of the different demand of each one of the above categories the following criteria appears:

<table>
<thead>
<tr>
<th>Quality of the physical environment needed</th>
<th>Poor</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Necessary activities</strong></td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td><strong>Optional activities</strong></td>
<td>X</td>
<td>XXXX</td>
</tr>
<tr>
<td><strong>Social activities</strong></td>
<td>X</td>
<td>XXX</td>
</tr>
</tbody>
</table>

*When the quality of outdoor environment is good, optional activities occur with increasing frequency. Furthermore, as level of optional activity rise, the number of social activities usually increases substantially*

Now the input from "Identification of quality needs" can be entered in each one of these categories; their importance will be given by the frequency of the related activity.

The difficulty of this procedure relays in that the identified quality needs had to be labelled as belonging to a poor or good quality physical environment and to, at least, one of the expressed activities. This labelling will come from expert's judgements as a practical criterion.
As the rest of the models, this one also has a limited perspective, and specifically it does not include social environment and transportation, for example.

5. Input from the identification of requirements

Undertaking an assessment on the importance of the identified needs and requirements faces us with a practical problem to be solved: needs and requirements are different matters, can not be assessed jointly. But quality needs can also be hierarchically organized in General and Specific objectives, each one holding their own standards or requirements to be implemented. See The San Antonio-Bexar County Metropolitan Transportation Plan Mobility 2030 (2006) or The Grand Fork- East Grand Fork 2035 Long Range Transportation Plan (2007).

The following schema illustrates a possibility:

1.- General need “A”
   1.1.- Specific needed quality
      1.1.1.- Requirements
      1.1.2.- Requirement
   1.2.- Specific needed quality
      1.2.1.- Requirements
      1.2.2.- Requirements

2.- General need “B”
   ...
   .... Idem to former
   ...

Following the procedures mentioned previously the task of organizing hierarchically the necessities can be facilitated. Once the quality needs have been assessed as real, good, placed well hierarchically or whatever criteria will be accepted, its time to focus on and to identify the requirements and constraints affecting these qualities. For instance: some concepts have been already developed like “pedestrian principles” (Walk21), the 5C’s (connected, convivial, conspicuous, comfortable, convenient), “the analysis of active transportation groups”, which may work as a pattern for requirements.

The identification of requirements would be the input for the assessment of importance of Quality needs. At this point a panel of experts is suggested to match requirements and needs provided that this task had not been done before. We suggest the coincidence of more than the 75% of the judgements of an established group of experts.

In a second stage another panel of experts will sort the specific needs according to the general need where it belongs.

As a last call of attention before boarding the next procedure, it would be good to keep in mind that we will find always preconditions for activities of architects and planners, which may differ in their scope from other stake holders.
6. Assessment based on a Multiple Categorisation of Concepts

This is a complex procedure in which we can take advantage of several concepts already developed like “pedestrian principles” (Walk21), the 5C’s (connected, convivial, conspicuous, comfortable, convenient), “the analysis of active transportation groups”, “hierarchy of walking needs” also the “pyramid of needs of pedestrians”, etc.

In a first stage, it will take the form of a matrix of classification based in judgements. The criterion for acceptance is the coincidence of more than the 75% of the judgements of a group of judges from a panel of experts.

In a second stage another panel of experts will rate the items by relevance by giving them a subjective value in Likert’s type scales.

How the classification matrix will look like depends on the input received from the former steps.

Following, some examples of assessment instrument types.

Example 1 Integral assessment grid of the above perspectives:

<table>
<thead>
<tr>
<th>Need x requirement</th>
<th>Bradshow’s classification</th>
<th>Level in pyramid</th>
<th>Gehl’s Activity</th>
<th>connected</th>
<th>convivial</th>
<th>conspicuous</th>
<th>comfortable</th>
<th>convenient</th>
</tr>
</thead>
<tbody>
<tr>
<td>description</td>
<td>number</td>
<td>number</td>
<td>number</td>
<td>0 to 5</td>
<td>0 to 5</td>
<td>0 to 5</td>
<td>0 to 5</td>
<td>0 to 5</td>
</tr>
</tbody>
</table>

Example 2 Multidimensional based scaling:

Rating each need and/or the requirements for each need in the following factors or dimensions:
- safety/vehicular traffic,
- security/fear to meet (victimisation),
- air quality,
- comfort/weather,
- ease to find the way,
- ease to rest/to find toilets,
- ease to walk (pavement conditions, obstacles, ramps),
- ease to choose the route,
- visual comfort/lightness,
- aural comfort,
- …

Each factor or dimension will be constituted by specific items which will be rated by Likert’s type response scales, e.g.: 1 to 7.

Example 3 Choosing based scaling (stimulus comparison data):

- Task or question: Among the following list of requirements, select/choose the 3 more important for fulfilling the need X.
7. Conclusion and Recommendations

Two main conclusions from this study can be made:

1) Any of the different models and perspectives developed, appear to be complete, and apt for general use. For each model lacks, limits and restrictive uses can be listed. They also provide good ideas and suggestions.

2) These models suffer of a poor research support and, even, the lack of practical evidence. Surely due to the complexity in the identification of what should be measured (e.g. definition of need, identification and agreement on the attributes to be measured, etc.)

And as recommendation, we would say that our proposal attempts to overcome the most of lacks and restrictions shown by the different models overviewed in this paper. Whatever it will reveal itself as efficient and as a valid method to assess the importance of needs, belongs to the field of research on which our work means the first step. Results coming out of this research may probe whether our multiple models excel or not the single ones revised.

Figure 3 Different perspectives regarding requirements based on expressed needs (source: http://www.projectcartoon.com/)

References

B.5.7. Assessing the importance of needs and requirements


Analysis of the current systems for pedestrians

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Horowitz’s rule:
Wisdom consists of knowing when to avoid perfection
Arthur Bloch

Summary

A large variety of stakeholders is involved in policies with an impact on the pedestrians' urban environment, at the European, national, regional and local levels. Such policies range from urban and land-use planning to detailed road and street design through transport and traffic management, traffic safety, health promotion, reduction of CO2 emissions or even regulatory policies on the prevention of terrorism and violence. Policies are rarely coordinated with regard to their impact on walking and on walking conditions although some of their components do interact. With such a complex decision-making system, analysing how current pedestrians' environments satisfy pedestrian quality needs requires a systems approach covering all relevant policy components.

Because of the number of stakeholders involved and the complexity of their relationships, there has been so far no system-based assessment of the quality of pedestrians' environments. However, analysis of the current situation at the European, national or local level is needed to raise awareness of the need for progress, in the general public, in the relevant groups of policy-makers as well as to identify the priority problems to be treated. In order to facilitate the analysis, guidelines are proposed to check the level of satisfaction of pedestrian quality needs provided by policy-components and by the physical urban environment.

The first part of the guidelines addresses the national level and focuses on legislation and policy-making as a framework (or pre-condition) to practical interventions on the walking environment; the second part addresses the local authorities in charge of designing or implementing changes in the urban public space as well as the national actors who may want to get a global analysis of what is going on in urban areas countrywide.

Any of the stakeholders involved at the national or the local level may take up the analysis task. It is hoped that the methodological tools provided will encourage them in taking up the issue of Pedestrian Quality Needs and will help them identify the areas in need for progress.

1 From: Murphy's Law
1. Introduction

The previous chapters on the subjective and objective needs of pedestrians examined the physical and social environment and transportation offer from the pedestrians’ point of view. The chapter on requirements identified the conditions for satisfying pedestrians’ quality needs in the design of the urban, legal, and transport environment and formalized these conditions into checklists. This chapter focuses on the analysis of the actual state of the pedestrians’ environment in urban areas, using checklists and other tools. It addresses two target audiences: first, the public stakeholders who are the managers of the physical and legal environment of pedestrians, and second, the pedestrians themselves or the organisations representing them. The public stakeholders need to know where they are in order to be able to progress; the pedestrians need to pinpoint their unsatisfied needs in order to put pressure on decision-makers and push forward policies to improve their situation. In European countries, these two groups of stakeholders operate at three levels: international (the European Community), national and local (city authorities and community based actors).

The diversity of relevant stakeholders makes it difficult to assess what level of accomplishment European countries have reached in satisfying Pedestrian Quality Needs: in practice, a large part of the measures and policies addressing walking (at least all those aimed at meeting “first order” or operational requirements) are in the hands of local authorities and of local stakeholders who usually act on their own initiative and independently from national governments. At the national level, knowledge of the situation in local communities is not comprehensive. Moreover, the policies adopted for pedestrians are far from being homogeneous over all local authorities. With regard to “second order” requirements, the current situation in terms of rules and regulations has seldom been analysed from the viewpoint of pedestrians. Thus, current knowledge of the state of the system is bound to be patchy. In this very project, the review of country reports indicates how difficult it is to get adequate and comparable information.

Rather than a full picture of the compliance with pedestrian quality needs of the current pedestrians’ environments in Europe, we have therefore chosen to provide some methodological guidelines; these should help the relevant stakeholders analyse the current state of the systems they manage with regard to the satisfaction of PQN.

Any of the stakeholders listed below may be interested in promoting walking and pedestrians’ mobility and sojourning conditions in urban areas, and is thus a potential audience for these guidelines. The will to act, or to convince or put pressure on better empowered actors to act, is indeed a pre-condition for them to get interested in systems’ analysis. Knowledge of the requirements for satisfying the most important pedestrian quality needs, and tools to assess whether these requirements are met by the system managed at the level of each stakeholder, are necessary to acquire the basic information needed for action.

The present guidelines present:
- an overview of actors who may be involved in pedestrian-related policy issues;
- an overview of the policy-areas which may affect the pedestrians’ systems and therefore have to be explored in a comprehensive analysis;
- some basic tools to perform the analysis (checklists summarizing the pre-conditions and requirements to satisfy pedestrian quality needs at the strategic, tactical and operational levels).

The policy overview and practical tools have been developed on the basis of our current knowledge and will need to be further refined, using the feedback of the analyses which will be performed.
For the decision-makers and actors in the field to take action towards satisfying Pedestrian Quality Needs, there are some necessary conditions such as basic awareness of the issue, political will or interest to act and a suitable organisation and communication means. We hope that these guidelines, as summary as they are, will not only be a useful tool, but will also help in focussing attention to pedestrians and in mobilizing some of the relevant stakeholders. We also hope that they will provide practical clues to support the efforts of pedestrian advocacy groups, policy-advisors and decision-makers in meeting pedestrian quality needs.

2. The stakeholders

2.1. Stakeholders at the European and international level

At the European level, few policies have specifically targeted pedestrians although walking is a transversal dimension in most safety or mobility policy-making processes (for example, protection of pedestrians during a crash through energy absorbing vehicle features, speed regulation and enforcement, etc.). However at the research level, several European projects (PROMISING, WALCyg, etc.) as well as COST Actions have focussed on non-motorized road users. Other international organisations have devoted several of their experts groups to the same subject, producing meta-results and guidelines for decision-makers (OECD, ECMT).

The active stakeholders include therefore the European Commission, international organisations summarizing knowledge (OECD and also private organisations lobbying for safety such as ETSC) and the managers of research programmes at the European level. One should add the lobby groups who do or may push the PQN issue: road safety associations such as the Federation of Pedestrians Associations (FEPA), the European Federation of Pedestrians, the Federation of Road Accident Victims, and other associations or organisation acting, for example, for child safety (like Childstreet or the European Child Alliance).

The European Commission is a leading actor in promoting action aimed at improving pedestrian safety and mobility, based on the knowledge produced by its own research programmes (an intellectual investment not to be wasted!). In the past the European Parliament voiced the rights of pedestrians (European Charter of Pedestrian Rights) and asked the European countries to support and execute the charter. Direct co-operations also take place between Regions of European countries: there is definitely a potential for action there.

2.2. Stakeholders involvement in policy-making at the national level

At the national level, involvement of the Parliament in mobility and safety issues is to be expected, although the nature of this involvement varies: in some countries, the Parliament is directly involved in the decisions to implement new transport systems or new safety policies (for example in Poland with discussions on the National Road Safety Programme, or in Sweden with the vote of Vision Zero); in others, the Parliament plays only a marginal role such as participating in road safety consultative bodies through a small number of elected representatives (for example in France); in a number of European countries, a procedure of monitoring and checking programme achievement by the Parliament has been set up (for example in Denmark or Germany). As a matter of course, the Parliament ultimately votes the laws prepared by other national actors in transport or in traffic safety.
At national government level, the Ministries in charge of Transport and/or Environment and/or Public Works shape the pedestrians’ environment through land use and planning laws or policy papers which contribute to determining the needs for mobility and transport and the most adapted transport modes, both in urban areas and at the regional level. In the last decades, specific laws (voted in Parliament) or regulations (such as Government’s decrees) have also been enacted to develop sustainable transport, mostly with a view to reducing petrol consumption and CO2 emissions and to improving safety; these laws and regulations open opportunities to develop walking as a full-fledged transport mode and improve walking conditions (for example: in France, the Law on Air, 1993; in Italy, the Guidelines for Urban Traffic Plans, 1995).

As for traffic, the same governmental actors are responsible for the Highway Code which governs the use and thus the design of the carriageways, for the standards and guidelines to design streets and roads, and for a national driver training programme aimed at unifying drivers’ behaviour and attitudes. They may also implement temporary or experimental incentive programmes, either to encourage local authorities to act on the opportunities opened by national framework laws, or to develop their own initiatives and innovations with regard to pedestrians’ mobility and/or safety. For example in the 80s, experimental programmes on traffic calming measures for urban arteries (in the Netherlands in Eindhoven and Rijswijk; in France, “Safer Cities with Accident-Free Neighbourhoods” in sixty towns or neighbourhoods) or on the design of sojourning areas (in the Netherlands, BREV, or Ministerial decision on governmental financial contributions for Experiments in Sojourning Areas) have produced examples of “good practice”, served as demonstration projects and have sometimes inspired new legal frameworks.

Traffic education programmes addressing school pupils may be initiated by the Ministry of Health or Transport, but always in cooperation with the Ministry of Education. However, they may also be set at the regional level (for example, in the Netherlands) or at State level (in Federal countries). School education programmes may include lectures by visiting staff from the Police or the Health sector. A pre-condition for the implementation of traffic education is that the agencies responsible provide an adequate training system for the teachers or lecturers.

The Ministry of Interior is often, if not always, responsible for the orderly use of public space and thus passes laws on occupation of streets and parks which may in some instances conflict with the right of pedestrians to sojourn. Road safety may be under the responsibility of the Ministry of Transport or, more rarely in Europe, Health or Interior and there is usually a road safety institution to coordinate the management of inter-sectoral road safety programmes and policies. Road safety policies may diversely affect pedestrians according to whether they take into account pedestrian mobility needs on an equal basis as the mobility needs of other road users [OECD, 1998].

At the national level, most policies with a bearing on transport and the use of public space have to take into account the needs of all citizens or, for our purpose, of all road users. Thus, actions to comply with PQN are imbedded in the policies of all the institutional stakeholders with various levels of priority. Beside national governments, other stakeholders are involved in road safety and mobility policies, either from the private sector (vehicle manufacturers, insurance companies, etc.) or from the civil society (NGOs representing parents of road accident victims, parents of school children, road safety or health associations, pedestrian associations, environmental groups, etc.). Among these, only health groups or organisations, some mutual insurance organisations, and the NGOs specifically representing pedestrians or “vulnerable” road users such as children, elderly people, or mobility impaired persons, are inclined to promote walking and safe walking environments. Other groups have other, sometimes adverse, priorities [Muhlrad, 2009].
The urban and transport policies carried out until the 80s, while motorisation was developing at its fastest, usually included pedestrian issues only as an afterthought [Muhlrad, 2007]. Times are changing and the attention given to pedestrians has grown, at first because of serious safety problems which had to be solved, more recently because of environmental concerns: a fear of a worldwide overgrowth of motorisation and use of fossil fuels. However, even now, the promotion of walking remains one concern among many others with its own supporters and opponents. The stakeholders who are most likely to take the lead in improving walking conditions may vary from country to country according to the broader political and policy-making framework. It is thus difficult to state offhand which actors will find an interest in systematically assessing the current state of the system and should thus be particular targets for the following analysis guidelines. Generally, child safety may be a good entry point as it is a multi-sectoral responsibility (Transport, Health, Education) and public opinion can be strongly mobilized. To a lesser extent, mobility of elderly or mobility-challenged road users is a growing concern for the same sectors. Attention to walking as a transport mode is also bound to increase along with petrol prices (see trends and visions in WG3), which should raise the priority of PQN in the near future within ministries of Transport and the Environment. Policies towards the slowing down of Global Warming also call for increased mobility through non polluting means such as walking and cycling. These are windows of opportunities for improving the satisfaction of Pedestrian Quality Needs.

2.3. Stakeholders’ involvement in policy-making at the local level

In urban areas, actors’ involvement in policy-making follows a similar pattern as at country level, although the role of elected representatives is usually stronger. Local councils are fully responsible for local roads, mobility and traffic safety. Their various “technical services” (or local government Departments) are in charge of all the programmes directly or indirectly affecting Pedestrians Quality Needs:

- Departments of Urban Planning implement urban development plans within the framework of national laws. These plans govern future mobility conditions, and may or may not include specific walking (and cycling) infrastructure networks and dedicated public spaces for sojourning

- Transport, Traffic Planning, and Road Departments develop urban mobility plans (or transport and traffic plans) which organise the inter-connections of motorised and non-motorised transport modes and ensure rational design and use of urban street networks

- Health and Education Departments may both be active in information and education programmes and in child health and safety; moreover, the Health sector is involved in promoting walking as a factor of better health for the population, and in “tertiary” safety (emergency care and treatment of injuries) and it often champions the most vulnerable road users.

As communication and agreements between local governments and other local actors are relatively easy to establish, various non-institutional stakeholders (residents associations or community groups, parents of school children, road safety associations, health or other professional organisations, etc.) may participate more actively than at the national level in management and operational tasks. They can be involved in data gathering, planning and decision-making, the design of measures or local schemes, or the implementation of particular interventions (education, communication, etc.).

Local counter-lobbies such as, for example, Automobile Associations may oppose interventions centred on the promotion of walking. Similarly, other interests may be adverse to the rights of pedestrians to sojourn in public space: for example, the prevention of begging or sleeping on the streets, supported by some local authorities and residents associations, or the prevention of potential violence, usually supported by the local law enforcement agencies.
It has to be noted however that, in the smaller urban areas and in the outer parts of the larger ones, the less safe and most pedestrian-unfriendly areas are usually the through-traffic arteries. These are often owned and/or supervised by the regional or national road authorities and thus may have to comply with national recommendations or standards. Local authorities and other stakeholders often have to put pressure on the national and regional actors in order to get their priorities taken into account. Thus, they have to move from being actors to being a lobby-group.

Awareness of the importance of walking and of sojourning for urban life and community relationships is usually more vivid at the local level than it is for national actors. There may therefore be key actors at all levels of decision and policy-making who are concerned by PQN and feel the need to analyse the current state of the pedestrians’ environment. Long-term action is most likely to be initiated by one or a small group of Council members or Heads of local Departments. However, non-institutional stakeholders play a strong role and may also be targeted by these guidelines. Helping them to establish a state-of-the-art of PQN in their urban environment is a way to empower them in their lobbying activities on behalf of pedestrians and to strengthen their standpoint against adverse influences.

3. Analysing the state-of-the-art in terms of PQN at the national level

The national actors should be interested in assessing how the elements of the system they manage directly perform with respect to Pedestrian Quality Needs. They may also want to know how the elements managed by local actors perform, whether or not these have been supported by national framework legislation or incentive programmes.

We propose in this section to examine in some detail the national interventions which may influence of contribute to answer Pedestrian Quality Needs. These are mostly expected to meet “second order” requirements related to tactical level facilities and services (traffic and enforcement, network characteristics, vehicle regulations, etc.), and “third order” requirements which are pre-conditions enabling actors to perform second and first order interventions. Some “first order” requirements on the design of roads and the public space may also have to be met on the urban sections of the national road network (see also the more detailed description of requirements in previous chapter).

To facilitate the design of information collection on these issues, a checklist is provided as an appendix.

3. 1. Framework regulations

3.1.1. Overview

Many of the laws, regulations or directives enacted at the national level may have an impact, positive or negative, on pedestrians and on walking and sojourning conditions, even if they address other issues. The following categories of laws and legal documents need to be examined:

a) Urban and transport planning laws or directives which provide some rules to plan extensions to existing cities, rehabilitate city centres or old quarters of urban areas, and to link urban development with infrastructure and transport planning; such documents may include pre-conditions for the promotion of walking (dense areas with short distances to travel, for example) as well as provisions for walking and cycling networks.

b) Legislation and policy notes on sustainable transport or on clean environments, primarily aimed at reducing pollution, congestion, noise, CO2 emissions, etc.; such documents
may include pre-conditions for developing non-polluting transport modes such as walking and cycling, as full-fledged transport modes or as a support to public transport systems.

c) Framework laws or guidelines on transport and traffic planning which provide directives for organising mixed transport systems on the existing urban infrastructure and adapting road design to the new traffic and transport conditions; such laws and guidelines may refer to some Pedestrian Quality Needs on the tactical level.

d) Road safety policy laws or directives, aiming at improving road safety in the long term through radical changes brought to the environment as well as to transport practice (Sustainable Safety, Vision Zero, etc.); the implementation of such laws or directives involves large amounts of research to find new solutions, followed by specific mobility or safety laws to ensure the new solutions are applied by the relevant actors.

e) Specific road traffic and safety framework laws or regulations which empower the local authorities in implementing national policies or improving pedestrian mobility or safety through interventions which may be unpopular with other road users (speed reduction or traffic calming schemes, restrictions on private car use, etc.).

f) Traffic laws or regulations which aim at defining the desired behaviour of road users, and thus have an impact on the way roads and urban streets are designed to meet both legal and ergonomic requirements; according to their content, such laws, usually gathered in a Highway Code, may make pedestrian life difficult or easy.

g) Civil rights laws or Constitutional Rights which guarantee equal access to public space to all, or equal rights to mobility.

h) Security and order laws, decrees or decisions which regulate the conditions for sojourning in the public space; they may restrict the right of people to sojourn for security reasons (prevention of terrorism, prevention of urban violence) or introduce personal surveillance as a deterrent to unlawful or otherwise suspect behaviour.

i) Specific laws or directives ensuring equal rights to mobility or practical access to key services for physically challenged persons; such documents set requirements for the provision of adapted public transport and for accessibility (“first order” and “second order” requirements for the local authorities that implement them).

Categories (a) to (e) as well as (i) address local authorities which categories (f) to (h) apply to individual road users or are meant for all citizens. European countries’ legal systems include most of these categories of laws and regulations. In what follows, we will examine in details the most important ones.

3.1.2. Traffic laws and regulations

The Highway Code plays a determining part in the environment of the pedestrians: it defines their rights and duties as well as those of other road users and these rights and duties are reflected in education and training programmes and in the design of road facilities; behaviour is thus as much influenced by the educational and physical environment as by the law itself. As Highway Codes were primarily created to address a fast growing traffic problem in the early stages of motorisation, the role allocated to pedestrians did not take into account much of their needs (see, for example, the case of the Czech Republic which is a good demonstration of how such a situation can endure). While part of the Codes are framed by international conventions which all European countries have signed, there are still some discrepancies between the national legislations, particularly in areas dealing with pedestrians rights.

In general, Highway Codes deal with pedestrians crossing the road and aim at reducing the amount of disturbance they can bring into motorized traffic flows. In most countries, they afford little protection to pedestrians who are supposed to check traffic before crossing; however, in a few countries such as the United Kingdom, Norway, Germany, etc, pedestrians
are given absolute right of way... but only if they cross at dedicated locations (which are not always to be found at frequent intervals on a route). Exceptionally, revised Highway Codes provide pedestrians with extended crossing rights (for example, in the Netherlands). Very little is said of the provision of dedicated pedestrian paths or pavements, and continuity of the walking network has not yet been a subject of regulation. Obstruction of pedestrian pavements and paths, for example by parking a vehicle, is usually not allowed, although occupation of part of the pavements for commercial activities may be permitted by local urban laws. On stretches of roads or streets which are not equipped with footpaths, the pedestrians’ rights to use the carriageway are usually severely restricted. Finally, Highway Codes only address road user movements and do not include any rules about sojourning in public space.

Over the last two decades, specific laws have been enacted or items introduced in European Highway Codes to empower local authorities in controlling urban speeds in areas much used by pedestrians (mixing traffic modes on the same surface as in “urban yards”, 30 km zones, traffic calming measures, etc.). This involves a significant change of attitude of planners and traffic engineers and a switch of priorities as restraints are applied to car driving rather than to walking or cycling.

How strong is the enforcement of the Highway Code with regard to the duties of other road users towards pedestrians (respect of their rights and of their dedicated space)? To our knowledge, this has not been systematically assessed. As to pedestrian behaviour, compliance with crossing restrictions is still officially enforced in most countries, but again, there are indications that this has often been abandoned in practice, although it would not do to acknowledge it. In many countries where the Highway Code has not been recently revised, the actual practice increases the rights of pedestrians, as indicated by the Court cases which allocate responsibilities in accidents. There may be some exceptions: for example, although drinking-and-walking is not forbidden, Courts in some countries make drunken pedestrians sole responsible for accidents in which they were involved even if the opposing vehicle drivers were obviously speeding or ignoring pedestrians’ rights on zebra crossings [Muhlrad, 1993].

Some traffic regulations, which are usually but not always integrated in the Highway Code, improve pedestrian safety and comfort although they are not directly targeting pedestrians: speed limits on urban arteries, drinking-and-driving laws, etc. The level of enforcement of such regulations over the national territory is naturally of interest when analysing if Pedestrian Quality Needs are met.

In the analysis checklist, we thus have to include items: on the content of the Highway Code and of the various safety rules and regulations attached; on the provisions for enforcement and on the enforcement strategies to protect pedestrian rights and ensure compliance of other road users with the regulations influencing pedestrians’ safety and mobility conditions.

3.1.3. Framework laws, regulations or incentive programmes addressing local authorities
National governments may use framework laws, incentive programmes or other policy notes to encourage local authorities to improve walking facilities and the walking environment. Such framework documents may also help local authorities overcome the resistance of some of their citizens to changes resulting in lower priority to private cars: if a majority of citizens are not aware of (or sensitive to) the needs of pedestrians, national policy may well be a pre-condition for local improvement schemes to be implemented.

Policy notes and framework laws usually aim, either at developing specific infrastructures for pedestrians (or more generally non-motorized transport modes) with a view to introducing walking networks, or re-organizing the traffic and transport system on existing urban
networks through multi-modal Mobility Plans based on a combination of motorised and non-motorised transport modes, including walking (“second order” requirements). Such policies and laws may focus primarily on pedestrians and the promotion of walking although the target is usually broader: in practice, the relevant laws or policy notes may belong to categories (a) to (d) above, with a focus on urban planning, sustainable transport and the environment, transport and traffic planning or long-term road safety objectives (for example: in Switzerland, the Human-powered mobility Master Plan (PDLD), 2003, the Strategy for Sustainability, 2002, in France, the Law on Air, 1993; in Italy, the Guidelines for Urban Traffic Plans, 1995). Particular policy papers aimed at improving road safety in the long term, such as “Sustainable Safety” initiated in the Netherlands or “Vision Zero initiated in Sweden do not necessarily promote walking, but do emphasize protection of the pedestrians as “vulnerable road users” through speed management schemes which imply a complete reclassification of urban streets according to the traffic mix [Schermers & Van Vliet, 2001, SNRA, 1998, Wramborg, 2000]. Extensive evaluations carried out, in particular in the Netherlands, show that the systematic implementation of speed management principles leads to substantial gains in pedestrian safety and improves the quality of sojourning areas.

Incentive programmes may be introduced to support, either the implementation at the local level of the national policies and framework laws addressing pedestrians, or the experimentation of new urban road designs and facilities aimed at increasing the satisfaction of Pedestrian Quality Needs (“third order” requirements); incentive programmes may also simply aim at stimulating local authorities' action and initiatives. National governments usually provide some of the funding necessary to implement local schemes and measures as both an incentive and a needed complement to local budgets; also, participating in funding is a way to establish or comfort a partnership with the local authorities. Other incentives for the local actors may include joining a network of local authorities involved in the same activities, or getting the local schemes used as demonstration projects and thus a national notoriety [CERTU, 1994].

The national government usually monitors incentive programmes and thus gets a full picture of the activities performed by the local authorities participating in them, but this is a biased sample which does not represent the situation in the whole country. However, the programmes implemented were evaluated and did provide new knowledge and experience on ways to meet Pedestrian Quality Needs; thus, they had a “snowballing” effect as the dissemination of case studies and examples led to more local authorities using the knowledge. This has been the case, for example in the 80’s in France with the programme “Safer Cities with Accident-Free Neighbourhoods”, in the Netherlands with the experiments of Eindhoven and Rijswijk, in Denmark in Vinderup and Skörböök, or in the U.K. [Borges et al, 1987, CETUR, 1989, OECD, 1998, PROMISING, 1999, Ward & Allsop, 1982]. More recently, the Netherlands have successfully used incentive programmes to launch their policies of Sustainable Safety. How wide the experience from pilot programmes has spread in each country and with what real effects on the pedestrians’ environment remains to be investigated.

The assessment checklist includes questions on the availability of framework laws and policy notes in the relevant categories, on the current and past offer of incentive programmes, on their explicit goals in relation to Pedestrian Quality Needs, on the types of components they recommend or request, and on the means used to promote their implementation. Questions on the participation of local authorities in the programmes, on the implementation of the framework laws and national policies at the local level, on the dissemination of “good practice” examples and their effects on stimulating local action are also relevant; however, they are at the interface of national and local policies and cannot be answered without analysing the latter.
3.1.4. Other relevant framework laws

Specific categories of particularly vulnerable pedestrians, such as children, elderly people, or people with mobility or sensory impairment are often targeted by framework laws or regulations: these ensure that the particular needs of the most vulnerable are taken into account when developing or improving urban neighbourhoods, public buildings or streets and open public spaces. The legal documents may be fairly general and merely state the right of all citizens to mobility and access to public services; conversely, they may target the operational level by specifying the elimination of "barriers" in public building, spaces and services (see for instance in Italy, the law “DPR 24 luglio 1996, N. 503). The laws may include or refer to a set of standards for the design of buildings and outdoor spaces (paths, pavements, open spaces, parking lots) which require or suggest layouts and specific facilities.

Health laws, plans or policy documents, which usually address the health professionals at the regional or the local level, may include the promotion of walking as a health issue; this leads to specific health education programmes addressing all citizens or particular groups such as the seniors (see, for example, the Environment and Health Action Plan formerly established at the federal level in Switzerland).

Other laws, mostly related to "order" in public places, may have negative or mixed effects on walking and sojourning. Most countries have laws which require authorization from the police or other government authorities to "gather" on streets, march or demonstrate; in times of crisis, there may be some narrow interpretations of what is a gathering (for example, in France, during the Algeria war, the threshold for a gathering was three people). The threat of terrorism may create such an atmosphere of crisis which may in turn lead to severe restrictions on sojourning.

Security on the streets is nowadays the reason that surveillance cameras (CCTV) are being put up in a large variety of public spaces, from commercial areas and transport nodes to ordinary streets. While the original motive is usually identifying thieves and criminals after the deed, misuse of the surveillance system may lead to a discriminatory use of streets and public spaces, especially for non essential activities such as sojourning (for example, when the hunt for illegal immigrants is open); it may also generate an uncomfortable feeling of being constantly under the eyes of somebody (in cities where surveillance teams have been created to monitor camera screens in real time). However, such measures are also deemed to enhance the feeling of security of the citizens, therefore encouraging them to walk more, especially in the evenings.

3.2. Education and training

3.2.1. Overview

Education addresses both the road users all along their life and the designers and managers of the urban, infrastructure and transport systems, the “craftsmen” shaping the pedestrians’ environment. Pedestrian-related issues have thus to be examined over a large variety of education or training programmes and activities, including those which specifically address drivers. This includes:

a) Education programmes aimed at shaping road user behaviour from a young age, which are dispensed in schools, sometimes even in kindergartens and are graduated according to age.

b) Training programmes aimed at improving behaviour and facilitating the acquisition of abilities to ride a bicycle, a moped, a motorcycle, a car, a lorry or a bus. According to the
transport mode considered, such programmes may be provided in secondary schools, but culminate in formal driver training preparing for the licensing exam.

c) Training programmes addressing elderly road users and aimed at helping them retain their abilities to drive, ride and walk as long as possible and adapt their travelling decisions at the strategic and tactical levels and their operational behaviour if need be.

d) Additional training programmes addressing young drivers a short time after their licensing exam to check their experience and strengthen their knowledge of key issues, and specific re-training programmes for multi-offending drivers, which may be mandatory or taken on a voluntary basis and are usually meant to help avoid withdrawal of the driving licence.

e) General communication programmes aimed at informing the road users of critical issues for mobility and safety, for example to enhance the acceptability of some measures or public space design, or geared at improving behaviour (complying with regulations, managing typical hazardous situations).

f) Specific modules on mobility and safety in the initial training courses leading to professions linked to the design and management of mobility and the physical environment, especially urban planners and engineers.

g) Specific modules on mobility and behaviour in the traffic environment in the initial training courses for education or health professionals and driver instructors.

h) Continuing education programmes focussing on mobility and safety and addressing professionals already in post, such as planners, engineers, teachers, health workers, driving instructors or inspectors, etc.

i) Documents or programmes addressing the decision makers and policy makers with a view to sensitizing them to issues related to vulnerable road users.

In what follows, we will focus on the implications for pedestrians of the most important of these programmes.

3.2.2. School education programmes

Traffic education in schools is not mandatory in all European countries; even when it is, education programmes are not always systematically implemented; conversely, traffic education may be integrated in some school curricula in countries where it is not compulsory.

Traffic education programmes, which may be adopted at the national level in countries where the education system is centralized, usually address the younger children as pedestrians; however, when children reach the age of 10, education starts focusing on bicycling, then two or three years later on moped-riding. The message is thus conveyed that walking is only for a temporary period of life when abilities to use other means are not yet developed (the "default" mean of transport). In practice, the "traffic gardens" which are still in use in some countries to deliver traffic education to the younger children place the child in the position of a car driver.

Education programmes, as they have been designed and as they are applied in practice, also need to be analysed in order to identify the messages given to children in the middle age group with regard to attitudes to pedestrians when using a two-wheeler. If traffic education is efficient enough to shape the behaviour of the future road users, then this is important! (see, for example, reports from the Rose 25 European project which compare educational activities in road safety).

The assessment checklist will include questions on the items of the school-based traffic education programmes and details of the delivery process which throw a light on the intended role of pedestrians in traffic and of walking as a mean of transport. It will also
examine the preliminary training schemes and programmes provided to teachers or school lecturers which are meant to influence the message later delivered to pupils.

3.2.3. Driver training programmes
In countries which have adopted a national driver teaching programme, the content and importance of the programme with regard to attitudes towards pedestrians and respect of their rights may be quite different. It is logically to be anticipated that when the Highway Code provides little rights but more duties to pedestrians, the image of the pedestrians conveyed to learner drivers through teaching as well as through practical experience on the roads may be poor. In countries where the Highway Code gives the right of way to pedestrians at least on zebra crossings such as the United Kingdom or Nordic countries (Finland and Scandinavia), drivers do appear better behaved at these precise locations; however, this may not prevent their attention to pedestrians to dwindle elsewhere. In order to be able to promote safe walking in our future environment, it is important to check that, at least for consistency, driver training programmes give the message that pedestrians are full-fledged road users whose movements must be anticipated and taken into account at all times, particularly in inhabited areas.

As the message communicated to learner drivers is greatly influenced by the quality of knowledge and attitudes of the driving instructors, it may also be relevant to examine the curricula of the professional training courses provided to the instructors and to see if specific continuing education modules aimed at promoting best practice in the implementation of the national training programme are on offer.

The assessment checklist has to include questions on the items relevant to pedestrians in the national training programme (if it exists) and in the professional courses for driving instructors.

3.2.4. Communication
Many European countries have managed communication programmes with a view to changing behaviour. At the European level, not much is known as to the content of the campaigns regarding pedestrians. Although the benefits of such campaigns, when carried out independently of other measures, cannot be measured in the short term, they undoubtedly contribute to the general climate. It will be therefore interesting to investigate which items in these campaigns address the pedestrians themselves, and which ones address the behaviour of other road users in ways directly or indirectly linked to pedestrian mobility or safety (for example, promoting compliance with pedestrians rights, lower speeds in areas where pedestrians are numerous, etc.).

The dissemination in the public of factual information regarding pedestrian welfare and quality needs is even less known. At the national level, this may be carried out through government campaigns, but also by other stakeholders using other media (for example, insurance companies may be active in this field).

In general, communication on transport, mobility, or safety includes much more than official or dedicated campaigns and include the advertisements aimed at selling products, in particular cars or motorcycles. Such campaigns may include some messages likely to have adverse effects on the way pedestrians are treated.

The assessment checklist includes questions for an inventory of relevant communication activities at the national level and on the content of messages that may influence the pedestrian social environment.
3.2.5. Professional education

Most professionals participating in road safety policy-making have had an education in universities or vocational colleges. Students in civil or transport engineering, planning, geography, mathematics or statistics, medical and health sciences, psychology, sociology, economics, etc. may all have a role to play in the design or management of the pedestrians’ environment at some stage in their career: getting some basic notions of pedestrian quality needs and, more generally, of mobility and safety of vulnerable road users within initial training provides a good starting point. It is therefore of interest to investigate if such teaching modules exist and in which disciplines they are mostly integrated. The situation appears to differ from one European country to another and may indeed differ between universities or vocational schools in each country.

As most professionals in the field will not have had this initial training and, in any case, knowledge and know-how about pedestrian quality needs has greatly evolved over the last decades, re-training courses are needed within the framework of continuing education. Here again, little is known of the offer of courses, seminars and other programmes to disseminate new knowledge to the actors involved in fields related to PQN. The information scattered over the internet may be sound, although incomplete, but the policy-makers and their technical support teams usually feel that access to this kind of information is difficult (see, for example, the results of a consultation in the European project DaCoTA, 2010).

The analysis checklist aims at an inventory of activities in these fields as well as an analysis of contents.

3.2.6. Communication towards policy makers

For policy-makers to focus attention on Pedestrian Quality Needs, they must be convinced that there is a problem and that the solution will bring benefits; they also need to understand the issues at stake and get full information of what can be done to progress. Some advocacy may be needed.

National policy-makers may be addressed by international structures and stakeholders, in particular European ones: this report is part of the exercise! Another typical example was the World Report on road traffic injury prevention issued by WHO in 2004 which paid particular attention to vulnerable road users and was followed by policy notes, in particular for Europe, and by best practice manuals, for example on speed management [WHO, 2004, 2008]. At country level, policy-makers in one sector (Transport, urban planning, etc.) may be addressed by another sector involved in promoting walking without having the power to implement the solutions (the Health sector, for example). Finally, the policy-makers may be addressed by researchers and non-governmental stakeholders in their own countries. They may thus get both a scientific or knowledge-based message and a more involved one by militant elements of the civil society.

The media for such messages may be diverse, from reports, guidelines and tool boxes to conferences, press or journal articles. There is some evidence that communication on pedestrians may be rather weak compared to other groups (for example motorcyclists or motorists). The situation may greatly differ between countries and is therefore worth investigating. However, this is hardly a subject that policy-makers themselves will want to investigate: other stakeholders specifically defending PQN will be more interested.

3.3. Road and vehicle standards

3.3.1. Standards or guidelines for urban road networks

Road standards for urban roads exist in some countries, but not in others, such as France, for example, where the fact that local authorities are responsible for safety on their roads
seems to preclude providing them with binding documents on how to improve road design. However, guidelines do exist where there are no standards: local authorities may consider them as purely advisory but most often use them as a technical support. Guidelines may include specifications for pedestrians which address capacity, comfort of walking and safety (see, for example, in Estonia). In some countries, when legal disputes arise on the design or equipment of urban roads, usually in accident cases, existing guidelines provide a reference for good practice and local authorities thus have to explain any deviation from the specifications relevant to the case.

Standards and guidelines are important to promote action by the local authorities, to encourage consistency in the design of road safety features and to help prevent the implementation of dangerous items (as, for instance, too steep speed humps). Although there has been no systematic monitoring of how standards and guidelines are used at the local level, experience has showed that it is difficult to implement road safety measures that would go against the grain. This is generally desirable except when experimentation of new principles or designs is at stake: for example in the 80s, the first traffic calming schemes for high traffic urban arteries required the implementation of speed reducing measures that were completely in disagreement with the current way of managing traffic; this meant that local authorities had to convince all major stakeholders it was worthwhile to take a collective risk, at least for a test-period (see, for instance, the French experimental programme “Safer Cities with Accident-free Neighbourhoods”).

Thus, guidelines and standards should encompass at least some of the requirements related to PQN if progress is to be made in promoting walking and sojourning. Moreover, they should allow experimentation (with monitoring) as this may be the only way to improve the toolbox available to urban and traffic planners and the local road authorities. Contents of existing standards need to be assessed as to their potential in satisfying Pedestrian Quality Needs. An inventory of the specific guidelines issued to improve walking conditions should also be useful.

Countries with a long-term vision of road safety policies such as the Netherlands (“Sustainable Safety”), Sweden (“Vision Zero”), etc. have established new standards or guidelines to re-design their urban networks. The principle of urban road classification as a basis to organise traffic and urban life originated with the Buchanan Report in the U.K. in the 60s and allowed for safe and walkable neighbourhoods to develop. Road classification based on the mix of traffic modes to be expected (including the non-motorized ones) has now become the basis to implement “sustainable safety” and sustainable transport policies or “Vision Zero” in urban areas.

The number and definition of road categories used in the different countries are not the same as they are tailored to the local situation inherited from history. Criteria to classify urban roads have been developed; following this, a set of standards has been defined to design each category of roads in relation to an appropriate speed level, itself determined by the traffic mix. The detailed design of the road categories with high pedestrian flows has been intended to satisfy at least the major PQN. It is not clear how much constraints are imposed to pedestrians on the other categories of urban roads.

The assessment checklist will seek first to identify which types of urban standards or guidelines do exist in a country. Then it will provide a number of questions to analyse the content of these documents from the point of view of PQN, framed on the basis of the auditing checklist provided in the previous chapter on “requirements” (“first order” mostly).

3.3.2. Vehicle standards

Vehicle standards are now mostly decided upon at the European level and therefore are common to European countries. Two elements are important for the pedestrians from a
B.5.8. Analysis of the current system for pedestrians

3.4. Availability of data on pedestrian activities and needs

Knowledge-based policy making is supported by data and technical tool to access knowledge and treat data. Conversely, the activities and measures implemented, especially when there are adequately monitored, produce a feedback of information and data. In this analysis of the pedestrian system, we have chosen to examine the data situation at the end of the checklist as data in itself will not improve the pedestrian environment: what policymakers and other stakeholders actually do is what is most important in the analysis.

The state-of-the art of data may be the best known element of all those participating in the pedestrians’ system, thanks to a number of European projects (in particular SafetyNET, culminating in ERSO, the European Road Safety Observatory) and to other co-operations (OECD, ECMT, etc.). We will only mention a few of the most important aspects here.

3.4.1. Pedestrian safety

In all European countries where accident and injury data collected by the police Forces has been compared with hospital and health data, it has been shown that pedestrian injuries sustained in a crash against a vehicle were under-reported (although perhaps less than cyclist injuries). Single pedestrian accidents (falls) occurring in the public space are not reported at all as the identification of a traffic accident is based on the involvement of at least one moving vehicle; however, falls are more numerous than collisions and in average just as serious as shown by studies performed, for instance, in Sweden and in the Netherlands.

There are indications therefore that the pedestrian safety situation as we know it is severely under-estimated.

We can also doubt that reported accidents are an adequate indicator of pedestrian safety as potential pedestrians are swift to switch to any other transport mode available (most often cars) when walking is felt to be tedious, uncomfortable or hazardous (see, for example, the decrease of the number of children walking to school which is acknowledged in most European countries and has even been targeted by counter-measures). Because of the adaptation of travel behaviour, areas where there are no pedestrian injury accidents may be areas where the road environment is so potentially dangerous (or felt as such) that walking is no longer performed. Surveys of citizens’ assessment of the safety of their walking environment and, more specifically, the amount of walking and sojourning displayed would be a nice tool to design and use in a systematic way to detect such problems.

3.4.2. Pedestrian mobility

National travel surveys aimed at measuring mobility and modal split usually define a trip through its main transport mode, even if some walking is required as terminal legs to the trip: There is in fact about as much walking to and from other modes as there is door-to-door walking (mono-modal walking), although this is not generally recognised. Moreover, very short trips may be ignored in some countries’ surveys (for example, in Great Britain, only trips over 300 metres are counted). The amount of walking performed is thus grossly underestimated. As to sojourning, it is almost never measured.

Travel surveys currently show that pedestrians walk only on “short” distance trips; however, the maximum length of these walking trips may differ according to what other modes of
transport are available. While a steep increase of petrol prices can be anticipated in the near future due to both, a shortage of oil production, and national policies to curb down the use of petrol as a reaction against Global Warming (see trends and visions in WG3), a reasonable assumption is that there will be a sharp increase of walking, especially on longer-distance trips. This should justify more attention to walking as a full-fledged transport mode and therefore to satisfying Pedestrian Quality Needs. However, no monitoring system of walking trips (volumes, frequencies, length, main locations, connection with other modes) has yet been set up to check this assumption and follow up the new expected trends.

4. Analysing the state-of-the-art in terms of PQN at the local level

The interventions that local authorities can perform are either “first order” or “second order” requirements and, much less frequently, “third order” requirements. These interventions are guided by the national framework of laws, policy notes, standards or other directives. However, the national framework cannot be assumed to cover all opportunities of action to satisfy Pedestrian Quality Needs, especially as knowledge and know-how develop with time and updating of national policies cannot be immediate. Moreover, some countries promote local initiative and experimentation as a way to increase interest and involvement of local stakeholders, stimulate imagination, and design new solutions in response to PQN requirements.

The analysis is thus at two levels:

a) To enable the national Government, or other national stakeholders involved in promoting walking, to learn of the state-of-the-art of local systems over the whole country. There is generally a lot of knowledge available on the activities and the degree of success of local authorities involved in a partnership with the State, for example through their participation in incentive or experimental programmes, but very little information is collected systematically on the activities of all local authorities and the state-of-the-art of pedestrians’ environments.

What we are suggesting is to develop a national observation system (NOS) of local practice on Pedestrian Quality Needs (which can of course be integrated in a larger observatory dealing with issues such as multimodal mobility). A checklist or survey guidelines have to be drawn to collect summary information at regular intervals, based again on an inventory of the relevant interventions.

In preparing the NOS, the performances should be considered both through a top down approach (how much and how effectively do local authorities implement the national directives or comply with the framework laws?) and a bottom-up approach (what are the main activities initiated by the local authorities to assess and improve PQN on their territories?).

b) To help the local authorities themselves, and other major local stakeholders, perform an in-depth analysis of the system they manage as a basis to define new interventions. Local authorities may also want to communicate with the public on the progress made through their past and current actions. Guidelines to establish local urban monitoring systems (UMS) of Pedestrian Quality Needs can be designed and should enable cities and towns to compare themselves to each other.

In order to prepare such checklists and guidelines, it is again necessary to get a clear view of the relevant areas of urban management.
4.1. Urban planning: providing for the pedestrians in new area or network developments

European cities continue to grow, so that urban planning remains a key issue for the future of walking. The various planning documents to be prepared by the local authorities are usually defined by the national framework laws or policy notes (see § 3.1.3 above). The level of attention to be given to walking as a transport mode in tomorrow’s cities may be supported by the national policy but may also be initiated by local authorities using the legal or institutional framework.

The practices of local authorities may vary even in the same country, and may differ in particular for size of the city or town. The planning documents are often checked, at list a posteriori, by the national agencies in charge of following up the implementation of framework laws, but any check there is usually focuses on procedures and on the compliance with some concrete legal specifications rather than on the full content of the urban plan.

In a national observation system (NOS), compliance of local authorities which the national policies and framework laws relating to pedestrians and PQN should be assessed in the planning documents and on their outcome; a good picture of the’ goals stated in cities' planning documents should indicate the level of priority given to walking in general and to PQN in particular. In the urban monitoring systems (UMSs), it will be useful to compare goals between all planning documents in order to check consistency with regard to Pedestrian Quality Needs.

4.2. Area planning and network design

New areas for residences and work are still being built, especially on the outskirts of cities and towns. However, rehabilitation of existing neighbourhoods for renewal, densification or improvement of safety and environmental amenities may be the most frequent on-going activities and therefore the most important for progress regarding Pedestrian Quality Needs.

Since the 60s and the SCAF guidelines (Sweden), new residential areas have been designed with specific pedestrian networks, segregated or made safe by eliminating through traffic and ensuring very low vehicle speeds. Older residential areas have been improved by re-designing the local streets and diverting through traffic according to the same principles [OECD, 1979]. Such areas are meant to meet PQN, but problems arise whenever pedestrians leave the area to reach another part of the city as long as there is no citywide vision of walking as an essential transport means requiring complete networks.

There are now interesting new initiatives in area planning such as “dense neighbourhoods” with low car ownership (for example in Switzerland, in France). Their design is based on the provision of residential amenities and a social organisation so that everyday trips performed for purposes other than work are short enough to be done by walking. Moreover, the space which in conventional residential neighbourhoods would have been devoted to vehicle parking is allocated to environmental amenities, leisure activities and sojourning. Most known examples of modern “car-free” or “dense” neighbourhoods are still experimental. Again, from the pedestrian point of view, such areas will meet the requirements only if they become part of a broader transport plan providing both a walking network and well distributed access to the public transport system for trips to other parts of the urban area; failing this, living car-free may well prove too difficult for the local residents.

In the national observation system (NOS), it is important to check how national policy notes, guidelines or standards are followed at the local level. This includes both, surveying which of the local authorities are actively implementing the directives and, assessing the quality of...
B.5. Policy process

implementation with regard to the satisfaction of PQN. In parallel to this top-down approach, it is also important to identify the new local initiatives and to describe them so as to be able to compare similar experimentations. Particular attention is to be given to the compatibility of the top-down and bottom up processes as both contribute to developing the pedestrian system.

For local UMSs, an assessment can be made of each implementation scheme and local initiative, using the checklists for “first order” requirements presented in the previous chapter as well as items dealing with the social environment.

4.3. Urban transport plans or traffic plans

Urban transport or traffic plans are usually designed to optimize the use of public space which is shaped by urban planning and rehabilitation. However, planning and organising transport and mobility in cities are major keys to PQN as these activities determine the amount of walking that will be performed as well as the traffic and physical environment for walking and sojourning.

As in urban planning, transport or traffic plans may follow a general rule defined at the national level, with or without policy orientations of concern for pedestrians. However, there is no global reference structure for the content of such plans whose components are multiple and can be combined in many ways. Countries in Western Europe have started focussing on public transport since the late 70s while in the Eastern part of Europe, the recent rapid growth of private vehicle ownership has produced opposite, hopefully temporary, policies which tend to discourage walking. Thus the situation is far from being homogeneous over Europe and the initiative of local authorities is bound to produce very different outcomes.

In a national observation system (NOS), it is useful to determine how the policy documents enacted at the national level are used by local authorities and how their orientations are actually implemented. In a UMS, what is important is to figure out which elements of the current or planned transport plan do encourage walking and whether any deterrents can be detected; at the operational level, the details of public space allocation and design need to be analysed with respect to the satisfaction of pedestrian quality needs; to this purpose, the checklists for “second order” requirements introduced in the previous chapter can be used.

4.4. Urban road classification and design, traffic calming

Road classification and re-design and equipment according to standards and guidelines is a heavy endeavour and has not yet been fully implemented, even in countries promoting this systematic approach (the Netherlands, Sweden). The detailed design of each class of roads or streets includes a different combination of the components aimed at controlling speeds and at separating or, on the contrary, mixing flows of road users.

Traffic calming schemes which are particularly directed at pedestrian safety and mobility are now well established, at least in Western European countries. Their design may range from “urban yards” (the Netherlands or “residential areas” (Switzerland), where vehicles are expected to drive at near-walking speed, to “30 km zones” (Belgium, Switzerland, France, the Netherlands, etc.) where entry points are well marked by specific warning devices or speed breakers and low speeds may be further encouraged by street design or equipment.

More generally, in a urban monitoring system (UMS,) an analysis of all the details of the local road system with regard to PQN has to be performed. Attention is to be given to walking amenities (continuity, capacity, comfort), crossing facilities and provisions for sojourning (resting facilities, design of open spaces, etc.). The analysis should show how Pedestrian
Quality Needs are met, based on the “five Cs” qualifying them (Convenient, Connected, Convivial, Comfortable and Conspicuous). The checklists for “first order” requirements introduced in the previous chapter should be one of the tools for this analysis.

4.5. The social environment of walking and sojourning

Walking and sojourning may be comfortable and easy only if both the physical environment and the social environment are adequate. In the social environment, we will include here two components: the attitude and behaviour towards pedestrians of other traffic participants and the local manifestations of the principles of governmental or local authorities with regard to usage of the public space.

4.5.1. Attitudes and behaviour of other road users

Drivers and riders attitudes towards pedestrians are influenced by education and training activities and the physical environment, as explored above. They are also subjected to the prevailing culture of walking, safety, and using the public space for human contacts as well as for mobility. Moreover, attitudes are motivated by deeper social concerns such as “class” differences (pedestrians may be considered as the poorer elements in society and thus easily ignored) or by simple competition for space. Use of the car or the motorcycle as playthings may be one of the factors emphasizing the competition issue.

Whatever the determinants of other road users’ attitudes and behaviour towards pedestrians, it would be useful to develop indicators to be integrated in UMSs, describing the interactions of drivers or riders with pedestrians crossing their paths, whether at dedicated places or elsewhere. Recording interactions of pedestrians and cyclists, where they share the same space or where pedestrians are crossing is also of interest.

4.5.2. Principles of usage of the public space

What is really important for pedestrians is the amount of restrictions that can be imposed on walking and sojourning. As seen earlier, there may be laws at the national level governing the use of urban space, usually enacted for security purposes. Implementation of these laws by local authorities may vary for political reasons, but their responsibility is involved if any trouble arises, so that in all likelihood, the laws will be strictly implemented. This may be checked in a NOS.

Local authorities may themselves restrict the use of public space for stated reasons ranging from security to calm and peace for the residents. The activities forbidden may include begging, playing music, playing ball, etc. Some cities have attempted to impose a curfew for young residents. Others provide meeting areas for youngsters outside residential areas, which implies that gatherings are unwelcome on the latter. Parks or green areas are often closed to the public at night. Resting facilities (benches) may be eliminated in order to prevent homeless people to get into the habit of sleeping at particular locations. Finally, surveillance cameras tend to multiply, which may enhance the security feeling of part of the pedestrian population, but may be a severe deterrent to particularly vulnerable groups (for example, immigrants from different continents, whether legal or illegal).

Local restrictions of the use of public space may be related to building sites and road works and are then temporary. When local authorities deliver building permits alongside pedestrian walking or sojourning areas, or dig up a footpath to put in pipes or for maintenance purposes, proper attention is not always given to pedestrian needs, especially to the needs of the less able ones. Some countries have laws (included in the Highway Code) or guidelines which make the provision of alternative or roundabout walkways compulsory (in France, for instance), but compliance of the local authorities or the builders is not perfect.
In urban monitoring systems (UMS), at least an overview of the permanent restraints on walking and sojourning is useful. Samples of temporary restraints can be analysed to provide indications on current practice.

4.6. Specific measures addressing the less able pedestrians
The national framework laws addressing access, mobility and safety rights of the less able citizens (see § 3.1.4), in particular as pedestrians, may be implemented differently by local authorities, if only because existing facilities in the public space cannot be changed all at once. It is therefore interesting to include questions related to the implementation of the framework laws by the local authorities in a NOS.

Local authorities may also take initiatives to facilitate walking and sojourning for their senior citizens or for their residents suffering from disabilities. These may range from simple facilities to break walking trips (resting places, provision of public toilets) to facilitating devices for walking or crossing streets, and to the provision of walking aids, adapted slow vehicles or public transport services. Such technologies are not yet fully developed, but such initiatives are under way.

An inventory of local initiatives and indicators of their outcome (frequency of implementation, numbers of users, etc.) may be integrated in UMSs. Composite indicators may be developed for the NOS.

4.7. Availability of data on pedestrians’ activities and needs
Data on mobility safety, sojourning, etc. may be available at the local level even if it is not at the national level. An analysis checklist of the availability of local data, derived from the one used at the national level, may be developed to collect information for UMSs. A summary of the findings should provide an input for the NOS.

5. Conclusion and needs for further research
The description of the policy elements to examine in order to analyse the current state of the pedestrians’ environment underlines the complexity of the systems at the national and the local levels and the multiple nature of the analysis. None of the stakeholders who may be interested in performing the analysis can be expected to master the full picture or even to want to consider all of it. In practice, they may choose to analyse only the elements which are more directly linked to the system they are responsible for or on which they are working. In order to get a complete state-of-the-art and to build national observation systems (NOSs) or urban monitoring systems (UMSs), the contribution of a number of different stakeholders will thus be required.

The analysis which has been suggested is neither an assessment not an evaluation of the pedestrians’ environment with regard to Pedestrian Quality Needs. To evaluate, one would have to use a priority ranking of needs, leading to a ranking of requirements and develop an indicator or indicators of achievement in terms of satisfaction of PQNs. To this purpose, further research is required.

The method of analysis as proposed here is nevertheless a useful tool to progress on issues of importance for walking: its application should pinpoint the areas or policy items where the situation is unsatisfactory or where too little is known of the items of concern for pedestrians. This will be where useful action can be taken.
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Appendix: Analysis of the current systems for pedestrians: checklist of items to consider for an assessment at the national level

The following checklist indicates in details the areas to be investigated. It is not in itself a survey questionnaire but can be used as a basis to develop one.

<table>
<thead>
<tr>
<th>Area</th>
<th>Specific system component</th>
<th>Relevant characteristics with regards to PQN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic laws and regulations</td>
<td>Highway Code</td>
<td>- Pedestrians’ rights when walking and sojourning&lt;br&gt;- Pedestrian rights when crossing&lt;br&gt;- Obligations for pedestrians (walking, crossing and sojourning)&lt;br&gt;- Provisions for pedestrian facilities (walking and crossing): type, size, design&lt;br&gt;- Regulations on occupation of pedestrians’ spaces and the vicinity of crossings (prevention of obstructions, of visual barriers, capacity, etc.)&lt;br&gt;- Regulations on pedestrian behaviour (drinking-and-walking, sojourning, etc.)&lt;br&gt;- Penalties for non compliance with pedestrians’ rights&lt;br&gt;- Penalties for non compliance with pedestrians’ duties&lt;br&gt;- Provisions for enforcement&lt;br&gt;- others</td>
</tr>
<tr>
<td>Specific safety regulations</td>
<td></td>
<td>- General speed limit in urban areas&lt;br&gt;- Provisions for lower speed limits to be implemented locally&lt;br&gt;- Provisions for mixed traffic streets or areas&lt;br&gt;- General drinking-and-driving laws&lt;br&gt;- others</td>
</tr>
<tr>
<td>Enforcement strategies and Court cases</td>
<td></td>
<td>- Directives for the enforcement of pedestrians’ rights&lt;br&gt;- Directives for the enforcement of pedestrians’ duties and behavioural rules&lt;br&gt;- Directives on the checking and enforcement of rules on the provision and occupation of pedestrian spaces and facilities&lt;br&gt;- Legal practice on pedestrians’ rights and obligations (precedents of Court cases)&lt;br&gt;- Legal practice on the occupation of pedestrian spaces and facilities&lt;br&gt;- others</td>
</tr>
<tr>
<td>Traffic management laws and regulations</td>
<td>Re-classification of urban streets and arteries</td>
<td>- Categories of streets based on high or medium presence of pedestrians: definition (functions, activities, pedestrian and vehicle flows, etc.), priority levels of the different modes, rules for speed management, rules for the provision and design of pedestrian spaces and facilities</td>
</tr>
</tbody>
</table>
| Framework legislation or policy notes on urban planning and the provision of infrastructures | Urban development plans | - Categories of streets based on low presence of pedestrians: definition, speed levels, rules for the provision and design of pedestrian spaces and facilities
- others |
| --- | --- | --- |
| Specific regulations addressing mobility of road users with disabilities | Rules on occupation of public space | - Provisions for walking (and cycling?) networks: mandatory, advisory?
- Rules for minimal/maximal urban density (in peripheral areas, for new neighbourhoods)
- Linkages between urban planning and the provision of multi-modal transport systems: location of services generating or attracting pedestrians, access, access to public transport nodes
- Provisions for monitoring and enforcement
- Others |
| Security and civil rights legislation or regulations | Rules on occupation of public space | - Equal mobility rights for all
- Regulations addressing mobility of pedestrians with physical or sensory impairment (layout and design of pedestrian space and facilities)
- Regulations addressing access to public transport of impaired pedestrians
- Provisions for monitoring and enforcement
- Others |
| Incentive programmes addressing local authorities (Infrastructure, traffic, transport) | Experimental programmes: | - Goals of the programme and conditions for joining (specific items regarding pedestrians or walking)
- Planning conditions (consultation of stakeholders, pedestrian participation)
- Quantitative targets regarding pedestrian mobility and safety
- Development of solutions and innovation
- Evaluation schemes
- others |
| Incentive programmes on priority issues: | Urban road safety programmes | - Quantitative targets (annual target for accident reduction, mobility target, etc.)
- Implementation of specific measures (pre-conditions, frequency, monitoring of effects) |
### B.5.8. Analysis of the current system for pedestrians

<table>
<thead>
<tr>
<th><strong>Education and training</strong></th>
<th><strong>National school education programme</strong></th>
<th><strong>Training of traffic educators</strong></th>
<th><strong>National driver training programme and driver licensing</strong></th>
<th><strong>Training of driving instructors and licensing inspectors</strong></th>
<th><strong>Post license training programmes:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Child safety</td>
<td>- Evaluation schemes</td>
<td>- Management of incentive</td>
<td>- Content of theoretical programme with respects to</td>
<td>- Training conditions to access the professions</td>
<td>- Conditions for being eligible to a re-training programme (anything related to pedestrians?)</td>
</tr>
<tr>
<td>- Elderly pedestrians</td>
<td>- others</td>
<td>programmes at the national level</td>
<td>pedestrians rights and duties</td>
<td></td>
<td>- Content of programmes with regards to</td>
</tr>
</tbody>
</table>
### B.5. Policy process

| Professional training: initial programmes in engineering, planning, statistics and mathematics, psychology, sociology, medical and health sciences, economics, etc. (universities, vocational colleges) | - Identification of teaching modules or components related to mobility or safety with special attention to pedestrians (analysis, forecasting, prevention, design, etc.)
- Content of items related to pedestrians |
| Professional training: continuing education and training sessions for engineers, planners, etc. | - Identification of the offer of training programmes and continuing education on mobility and safety, with particular attention to pedestrian issues
- Content of items related to pedestrians in such programmes |
| Communication | National communication campaigns:
- mobility and recent changes in infrastructure and transport
- road safety
- others | - Identification of campaigns with a relation to pedestrians or to walking
- Public addressed and content of messages conveyed with regards to pedestrians
- Evaluation processes
- others |
| Incentive programmes for local campaigns addressing local authorities, NGOs, etc. | - Conditions for joining the programme
- Targets
- Advised content of messages, technical support
- Monitoring process |
| National standards and guidelines | Standards or guidelines for urban road networks | - Existing standards or guidelines (*see also re-classification of urban streets*)
- Content of guidelines with regards to pedestrian spaces and facilities (crossing, walking and sojournning): *see the detailed checklist on first order requirements*
- Provisions for experimentation of new designs |
| Standards for manufactured or imported vehicles | - Profiling of vehicle front (reduction of aggressiveness)
- Front protection in crashes against pedestrians (shock absorbers)
- Side protections in crashes against vulnerable road users
- Intelligent speed adaptation systems |
Evaluation of the pedestrians’ performance and satisfaction

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‘…The proof of the pudding is in the eating…’

Summary

The discussion of the evaluation of the pedestrian's performance and satisfaction is an important link in the policy development chain for quality improvement for pedestrians. It helps finding out what current deficiencies and future prospects are regarding walking and sojourning for the greater good need attention.

The aim of the present study is to present a comprehensive and true generic picture of the pedestrian’s functioning and satisfaction with offered conditions, and to identify clues for improvement. In order to provide a true picture of reality, hidden issues must be uncovered, and figures be corrected for bias, by complementary estimations. Furthermore, reality must be evaluated from all relevant perspectives: functionality, perception, durability and future prospects, and coherence and integration.

A decisive factor in pedestrian performance and satisfaction is the pedestrian’s ability to cope with his environment. Pedestrians are an extremely heterogeneous group. The functioning of the system depends particularly on how well low competency persons can function. The order of magnitude of mobility restrictions can be estimated through much used indicators from the SF12 surveys and OECD indicators for Quality of Life studies. Additional indicators can be derived from travel surveys and health statistics on disorders. About 50% of the pedestrians have limited abilities and about 10% of the population has severe difficulties walking and sojourning in public space.

Mobility is defined by the freedom to choose to travel and sojourn in public space. The amount of distance that one can cover is less important than being able to make a trip. Pedestrian mobility differs from other modes by that it is part of almost all other trips. Multi-modal walking is (almost) as extensive as walking from door to door, but this is hidden in statistics. However, the hidden amount of walking can be estimated within reasonable margins.

Based on available statistics an image of major characteristics of walking can be formed. Action radius, age, urbanity and opportunities seem to be the most significant factors. The normal action radius of a pedestrian is ± 1 kilometre; an average (European) citizen walks 250 door-to-door trips per year and 1,800 times to and from other modes. In total pedestrians cover ± 300 kilometres and spend about 100 hours per person per year on walking.

Sojourning in public space is important because it is an indicator for quality of public space and it encourages all kinds of activities, which humans need for their well-being. There are many kinds of sojourning: professional activities, recreational activities, waiting, hanging out, but public space is also the home of the homeless and sometimes the scene of crime and violence. The concept of sojourning is rather unknown in the Anglo Saxon countries, but this
article aims to help to change that. The average amount of time spent on sojourning is about 100 hours per person per year.

Safety and security concern the absence of risk, accidents and potentially harmful incidents. Safety includes security; security is seen as a condition, where one is protected against danger from the outside. As walking is the only mode open to all persons, safety and security must always be seen in the context of mobility and accessibility, particularly protecting the ones that do not have a choice but to walk.

The most used safety indicator is traffic accidents. As accidents that do not involve a moving vehicle, are excluded by definition, the data provide a severely biased image of pedestrian safety. Hospital data and medical assistance data show that single pedestrian accidents (falls), where no moving vehicle is involved, induce three to nine time as many casualties as pedestrian-vehicle crashes. Although the risk varies per country and type of accident, the total number of victims for Europe amounts to at least 1.6 million injured pedestrians per year in Europe (equals more than 3,000 casualties per million inhabitants).

As for fatalities, because of the overwhelming external force, pedestrian-vehicle crashes dominate the outcome. The total numbers of pedestrians killed vary from 9 fatalities per million inhabitants in the Netherlands to (more than) 46 in Poland. In the Netherlands the number of vehicle related fatalities per million inhabitants is 6, whilst the number of fatalities from falls is 3.

Concerning severe injuries (casualties admitted to a hospital), for the moment, the only figures available come from the Netherlands. As traffic statistics indicate that the Netherlands is the safest country, the figures for other countries will probably be (much) higher. It is found that the total incidence of pedestrian injuries is 320 per million inhabitants (over 175,000 severely injured Europeans). Of this, 250 per million casualties result from falls (135,000 Europeans) and 75 per million from pedestrian-vehicle collisions (27,000 Europeans). The elderly run extreme risk.

For security the number of incidents is less normative than the fear and emotions it evokes. Compared to traffic accidents and falls, the actual risk on getting injured or killed in a criminal incident is substantially lower. Fear is a reality that needs to be taken into account, because it takes away people’s freedom of mobility. Particularly during dusk and night time, especially females and the elderly fear to be involved in a harmful incident. Statistics show that the real number of criminal acts in public space is stable over the years.

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. There is little research carried out on pedestrian satisfaction. The sparse information about what dissatisfies people comes mainly from complaints that local authorities and NGO’s received via hotlines, questionnaires or internet sites. It is striking that the aspects people communicate are mainly about operational nuisances and that hardly anyone mentions tactical or strategic level deficits, like network deficiencies, dysfunctional distribution of services etc.

With regard to walking and sojourning, demonstrable serious problems and deficits problems are partly or totally hidden from public, scientific and political attention. Major issues for policy making with regard to the pedestrian performance and satisfaction are:

- Large numbers of people have real trouble performing ‘walking and sojourning’ tasks. Because of ageing of the population the numbers will increase substantially.
- With regard to safety of pedestrians, particularly the prevention of falls is important; this is also an age related problem.
- There is too little awareness that without walking transportation is not possible.
The vicious circle of no data – no awareness – no priority - no research – no data, needs to be broken. The lack of data/information on walking and sojourning is imminent; Some crucial concepts and statistical units need to be redefined and internationally applied.

1. Introduction

In the PQN project structure¹, policy development for the support of the Pedestrians’ Quality Needs starts with the development of a ‘vision’ on the desirable and expedient state of the system. The next stage is to evaluate what is actually offered, how pedestrians function under those conditions and how satisfied they are with what their environment offers. In this policy development stage the aim is to find out what needs to be kept and what needs to be improved. The results of this work serve as input for the next stage, which is to identify or develop strategies that can improve the pedestrian’s situation and to select the most promising ones. In the last stage of the policy development process a decision on measures to be taken is prepared. This includes the assessment of the added value of selected promising strategies for the responsible organisation. The assessment of the added value is important, as for the organisation not only the benefits for pedestrians count, but other policy arguments matter, too. This stage also includes the formulation of the improvement plans and the actual decision on the implementation of the plan.

The PQN Working group 4 aimed to provide insight in important issues at each of the discerned stages. The working group documented available insights in a series of articles in Part B: Documentation of the PQN final report.

With regard to the first stage ‘Development of a ‘vision’’, important documented aspects are the identification of pedestrian needs, the translation of these needs into requirements regarding the pedestrian’s environment and the rating of desirable qualities, to support the formulation of concrete ‘visions’ on the desirable and expedient system.

The second stage of the policy development process ‘Evaluation of the current situation’, is broken up in two parts. The first part deals with how well the pedestrian’s environment² and the conditions and opportunities that are actually offered, comply with the quality requirements as they are identified in the ‘vision’, in guidelines, legislation, policy statements etc. This part is discussed in the separate article ‘Evaluation of the current system’ by Nicole Muhlrad (see PQN Final Report section B.5.8).

The second part of the policy development stage concerns the evaluation of how pedestrians actually function and how satisfied they are with what their environment offers them. In the present article this is discussed; this article aims to show what the general situation regarding the pedestrian’s performance and satisfaction is and what issues need policy attention.

Some important issues in this context, which need to be substantiated, are:

- How can walking and sojourning performance, benefits and risks be assessed? What use do pedestrians make of the offered facilities, services and opportunities? What performance indicators can be identified and applied?
- To what extent are pedestrians satisfied with offered facilities, services and opportunities to walk and sojourn in public space?
- What current deficiencies and future prospects need attention? What is or may become a problem?

¹ see PQN Final Report Part A and Part B, section B.5.2, Figure 1
² The pedestrian’s environment includes the physical environment (sites, networks, land use, atmospheric conditions), the social environment (other persons in the environment, behavioural rules, legislation, policies, media attention etc.) and transportation (vehicles, public transport, traffic and mobility management).
2. Scope of the assessment of performance and satisfaction

The aim of the study for this article is to present a comprehensive and true generic\(^3\) picture of the pedestrians’ functioning and satisfaction with what the environment offers, and to identify clues for improvements, in particular deficits that need to be tackled.

The pedestrians’ performance is a consequence of his behaviour. It is defined by how complete and how well targets are achieved regarding walking and sojourning in public space and thereby goals of life and activities people want to do. In other words, performance concerns the degree to which one can actually satisfy one’s needs and walk and sojourn as often and as much as they wanted.

As argued in the Part A of the PQN Final Report Introduction and conceptual Framework, a person’s behaviour depends on a combination of interacting needs, opportunities and abilities (Steg & Vlek, 2009). The degree to which a person is able to satisfy mobility and sojourning needs will depend on the opportunities they experience and the abilities they feel that they have to seize the perceived opportunities. Abilities and opportunities set the stage for performance. Opportunities reflect what the pedestrian’s environment offers, as perceived by the pedestrian. Needs and abilities on the other hand, reflect features of the pedestrian, and more or less equals the demand side. Limited abilities restrict the pedestrians’ mobility, sojourning and safety performances.

From a number of studies (Harris, 1989; Methorst, 2003, Sauter, 2008) it has become clear that there are substantial gaps in data coverage of the issue and that most data are gathered for other purposes than acquiring insight into the pedestrian issue. For example accident data may be severely biased because of an inappropriate definition\(^4\), structural underreporting because of simple inattention, ignorance or even denial\(^5\).

In this regard also Rumar (2002) made some very relevant observations. In his paper for the ECMT\(^6\) on road safety problems he gives a handle to placing the variety of problems involved, relating to common data and research practises. Rumar distinguishes three orders of problems, which also apply to pedestrian quality deficiencies in general. Rumar states (op cit. Rumar, 2002):

1. **problems obvious even at superficial analysis of available data** (first order problems), for example crossing accidents

2. **problems revealed by a somewhat deeper analysis**, where mechanisms behind a ‘first order problem’ are more thoroughly studied and failure types are discovered (second order problems), for example determinants for speeding at pedestrian crossings

3. **problems almost totally hidden**; these problems concern ‘external’ mechanisms that influence auxiliary failure type factors (third order problems), for instance lack of data and policy decision processes\(^7\) that cause low priority given to improving the situation.

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\(^3\) Whenever possible, the evaluation will be focussed on the aggregated ‘international’ level; national and local situations may deviate substantially from this generic picture.

\(^4\) For example a traffic accident is only a traffic accident if a moving vehicle is involved. Falls and collisions with obstacles due to bad repair of the street surface are not reported in road accident statistics, because they are outside the common definition that cover only accidents involving vehicles. For a pedestrian it doesn’t matter much whether he is threatened, injured or killed by traffic on wheels, by a collision with other pedestrians, stationary objects, bad conditions of the pavement or a hooligan.

\(^5\) For example mobility statistics: in many cases respondents simply do not realise that they walked to or from their car or to public transport.

\(^6\) ECMT stands for European Conference of Ministers of Transport (now transformed into ITF (International Transport Forum).), which is an inter-governmental organisation within the OECD family.

\(^7\) For example a top down policy structure, where the attention to long distance travelling precedes the attention to the number of trips. In such policies it is assumed that short distance trips can be fully
First order problems appear to relate to directly observed operational behaviour\(^8\), whilst second order problems predominantly refer to tactical or strategic traffic and travel behaviour. Third order problems then appear to have to do mainly with travel and sojourn opportunities, travelling preconditions and research, knowledge and policy preconditions.

In order to provide a true picture of reality, the present study is based on the principle that an attempt should be made to bridge such gaps and compensate for biases, by complementary estimations. These estimations are based on insights in the relations pedestrian walking and sojourning behaviour and on indications from research in comparable situations. Thus an impression of the order of magnitude of indicators for pedestrian performance and satisfaction can be offered.

A second principle in the assessment of performance and satisfaction of pedestrian quality needs in the current study is that it is necessary to focus on four complementary perspectives:
1. functionality – **performance** regarding mobility, accessibility, safety
2. perception – **satisfaction** (to be asked to the stakeholders) regarding adequacy of preconditions for walking and sojourning and walkability
3. durability – future compliance and satisfaction; relation to life cycle of products, interventions measures (expert opinions)
4. integration and coherence - the results with regard to pedestrian quality, including preconditions for adequate policy making, context and responsibility realities for stakeholders and the added value of pedestrian quality, need to be placed in a wider setting. Where do compliance and satisfaction coincide and what are the differences? How do the various stakeholders value the situation?

### 3. Pedestrian quality of life, disabilities and handicaps

Abilities are a major determinant for walking and sojourning performance. As mentioned, limited abilities restrict the pedestrians’ mobility, sojourning and safety performances. In this context it is important to know what limitations pedestrians can have, how many people or what share of the population it concerns and how serious the consequences are for individual persons as well as for the functioning of society, at the local, regional, national or even European level.

Pedestrians form an extremely heterogeneous group. With regard to walking and sojourning performance, in general young and healthy male adults have the least limitations. They can walk the greatest distance, have fair safety records and the least problems with accessibility of buildings and other destinations. They are however not a majority, but a minority. Asmussen (1996) showed that a remarkably large proportion of citizens (almost 40%) can be considered to belong to a vulnerable group (see Table 1). On top of this, even competent persons can be temporarily impaired by being under the influence of alcohol or medical drugs, the use of a mobile phone or MP3 player, having fogged glasses, heavy bags, or simply distracted by their companions or interesting objects in shop windows (Fuller, 2005).

\(^8\) Note that observation depends on what the observer can and wants to observe. This may filter out observable features that are not expected or looked for.
Walking is the only travel mode that is available for everyone. In this respect it is important to note that there are persons that have the option to choose to travel by other modes and people that do not have such options. In general, the most able persons also have most options. Most handicapped persons, children and persons that are financially less well off, if they want to travel independently, their only option is to walk. So, in order to make the system work, the norms for the walking population cannot be defined by the most able persons or the average situation, but have to be defined by the greatest common denominator, which is a low competence level. This reflects the Design for All principle.

Asmussen’s table provides a general indication of the walking and sojourning limitations the population can have. More precise and detailed insight in the pedestrian’s limitations regarding walking can be deduced from general Quality of Life studies, which are performed in a number of countries. According to Statistics Netherlands (see: www.cbs.nl) there are two much used standards for measuring the citizen’s Quality of Life situation, the so called Short Format 12 (SF12) and the OECD indicators for Quality of Life. Both surveys include items that are relevant for walking and sojourning performance. Data from the SF12 survey are discussed in section 3.1. In Section 3.2 data concerning the OECD indicators will be highlighted.

In the Netherlands, in addition to this, a third indicator on perceived mobility handicaps is available from a special study related to the national travel survey (see section 3.3.).

<table>
<thead>
<tr>
<th>People with total loss of function</th>
<th>in Netherlands 1995</th>
<th>per million of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair users</td>
<td>70,000</td>
<td>4,400 = 0.4 %</td>
</tr>
<tr>
<td>Blind</td>
<td>15,000</td>
<td>940 = 0.1 %</td>
</tr>
<tr>
<td>Deaf</td>
<td>20,000</td>
<td>1,250 = 0.2 %</td>
</tr>
<tr>
<td>Total</td>
<td>105,000</td>
<td>6,590 = 0.7 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People with functional limitations</th>
<th>in Netherlands 1995</th>
<th>per million of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children 0 - 14 years</td>
<td>2,800,000</td>
<td>175,000 = 17.5 %</td>
</tr>
<tr>
<td>Walking impaired</td>
<td>400,000</td>
<td>25,000 = 2.5 %</td>
</tr>
<tr>
<td>Balance disorder</td>
<td>400,000</td>
<td>25,000 = 2.5 %</td>
</tr>
<tr>
<td>Limited stamina</td>
<td>400,000</td>
<td>25,000 = 2.5 %</td>
</tr>
<tr>
<td>Visually impaired</td>
<td>300,000</td>
<td>18,750 = 1.9 %</td>
</tr>
<tr>
<td>Hearing impaired</td>
<td>300,000</td>
<td>18,750 = 1.9 %</td>
</tr>
<tr>
<td>Cognitive and mental impaired</td>
<td>400,000</td>
<td>25,000 = 2.5 %</td>
</tr>
<tr>
<td>Temporary handicapped</td>
<td>500,000</td>
<td>31,250 = 3.1 %</td>
</tr>
<tr>
<td>Parents with prams</td>
<td>500,000</td>
<td>31,250 = 3.1 %</td>
</tr>
<tr>
<td>Total</td>
<td>6,000,000</td>
<td>375,000 = 37.5 %</td>
</tr>
</tbody>
</table>

Within the context of the PQN project (for the moment) for all three indicators only data from the Netherlands are available. Although the actual figures may vary from country to country, the Dutch data can help to determine the order of magnitude.

Alternatively, if available, revalidation data, data on parking permits for handicapped persons and data on the incidence and severity of specific disorders, like cardio-vascular diseases, strokes etc. can be used as indicator for the state of affairs regarding pedestrian abilities.
3.1. Short Format 12 indicators for pedestrian handicaps

The Short Format 12 (SF12) is a survey that is performed amongst persons of 12 year and older. The methodology was developed in the USA by Ware et al (1995). The SF12 consists of 12 multiple choice questions about several aspects of a person’s health. The questions are (in the Dutch version):

1. How do you rate your general health?
2. Does your health limit your ability to do considerable physical efforts?
3. Does your health limit you to climb a couple of stairs?
4. Because of your physical health situation, have you done less than you wanted to do?
5. Because of your physical health, were you limited in certain activities?
6. Because of feeling depressed or anxiety, have you done less than you wanted to do?
7. Have you been less careful in your activities than you wanted to be?
8. To what degree did pain limit your activities?
9. Do you feel calm and quiet?
10. Do you feel energetic?
11. Do you feel sad and gloomy?
12. How often did physical or emotional problems impede social activities?

It appears that in particular questions # 2, 3, 5, 8 and 12 relate to limited abilities with regard to walking and sojourning.

In Table 2, 3, 4, 5 and 6 the average survey results for 2001 – 2009 regarding the SF12 questions 2, 3, 5, 8 and 12 are displayed. Note that the figures do not include children (0–12 years of age).

The image coming from all tables is the same: it appears that with growing age, the proportion of the population that is not able to perform 'normal' walking tasks increases substantially, for females stronger than for males. More than 20% of the population do not feel able to carry heavy grocery bags, walk uphill, run to catch a bus, climb many stairs, and so on. At 75 this share is more than 60% of the group. This confirms the picture that Asmussen sketched in 1996.

In relation to the ageing of the population it can be forecasted that in 2020 the total share of the population with impediments to walk, including children, will pass 50% easily.

| Table 2 Health impedes considerable physical efforts – average 2001-2009 (Question 2) |
|---------------------------------|--------|--------|---------------|
| Age groups                      | males  | Females| males + females |
| 12 - 18 years                   | 5,9%   | 8,5%   | 7,2%          |
| 18 - 25 years                   | 6,5%   | 11,4%  | 9,1%          |
| 25 - 45 years                   | 10,3%  | 16,9%  | 13,6%         |
| 45 - 65 years                   | 18,0%  | 24,4%  | 21,2%         |
| 65 - 75 years                   | 21,7%  | 32,2%  | 27,1%         |
| 75+                             | 36,2%  | 46,8%  | 42,5%         |
| All ages                        | 14,6%  | 21,7%  | 18,3%         |

Source: Statistics Netherlands www.cbs.nl 18-3-2010
### Table 3  Climbing stairs impeded by physical limitations - averages 2001-2009 (Question 3)

<table>
<thead>
<tr>
<th>Age groups</th>
<th>males</th>
<th>females</th>
<th>males + females</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - 18 years</td>
<td>5.5%</td>
<td>8.5%</td>
<td>7.0%</td>
</tr>
<tr>
<td>18 - 25 years</td>
<td>5.1%</td>
<td>11.6%</td>
<td>8.6%</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>8.4%</td>
<td>14.9%</td>
<td>11.8%</td>
</tr>
<tr>
<td>45 - 65 years</td>
<td>20.7%</td>
<td>26.7%</td>
<td>23.7%</td>
</tr>
<tr>
<td>65 - 75 years</td>
<td>34.4%</td>
<td>46.0%</td>
<td>40.4%</td>
</tr>
<tr>
<td>75+</td>
<td>54.5%</td>
<td>71.6%</td>
<td>64.6%</td>
</tr>
<tr>
<td>All ages</td>
<td>17.0%</td>
<td>25.0%</td>
<td>21.1%</td>
</tr>
</tbody>
</table>

Source: Statistics Netherlands www.cbs.nl 18-3-2010

### Table 4  Daily activities impeded by physical limitations - averages 2001-2009 (Question 5)

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Males</th>
<th>females</th>
<th>males + females</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - 18 years</td>
<td>8.2%</td>
<td>9.9%</td>
<td>9.0%</td>
</tr>
<tr>
<td>18 - 25 years</td>
<td>6.5%</td>
<td>12.6%</td>
<td>9.7%</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>9.5%</td>
<td>18.5%</td>
<td>14.1%</td>
</tr>
<tr>
<td>45 - 65 years</td>
<td>21.9%</td>
<td>30.7%</td>
<td>26.3%</td>
</tr>
<tr>
<td>65 - 75 years</td>
<td>31.9%</td>
<td>47.3%</td>
<td>40.0%</td>
</tr>
<tr>
<td>75+</td>
<td>51.1%</td>
<td>73.7%</td>
<td>64.5%</td>
</tr>
<tr>
<td>All ages</td>
<td>17.7%</td>
<td>28.1%</td>
<td>23.0%</td>
</tr>
</tbody>
</table>

Source: Statistics Netherlands www.cbs.nl 18-3-2010

### Table 5  Activities impeded by pain - averages over 2001-2009 (Question 8)

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Male</th>
<th>Female</th>
<th>Male + Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - 18 years</td>
<td>21.9%</td>
<td>31.1%</td>
<td>26.5%</td>
</tr>
<tr>
<td>18 - 25 years</td>
<td>22.4%</td>
<td>35.6%</td>
<td>29.3%</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>25.8%</td>
<td>37.1%</td>
<td>31.6%</td>
</tr>
<tr>
<td>45 - 65 years</td>
<td>35.1%</td>
<td>45.3%</td>
<td>40.2%</td>
</tr>
<tr>
<td>65 - 75 years</td>
<td>38.7%</td>
<td>53.1%</td>
<td>46.3%</td>
</tr>
<tr>
<td>75+</td>
<td>45.4%</td>
<td>66.7%</td>
<td>58.1%</td>
</tr>
<tr>
<td>All ages</td>
<td>30.6%</td>
<td>42.9%</td>
<td>36.9%</td>
</tr>
</tbody>
</table>

Source: Statistics Netherlands www.cbs.nl 18-3-2010

### Table 6  Days per year of impeded activity - averages 2001-2009 (Question 12)

<table>
<thead>
<tr>
<th>Age groups</th>
<th>males</th>
<th>females</th>
<th>males + females</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - 18 years</td>
<td>24.6</td>
<td>27.8</td>
<td>26.1</td>
</tr>
<tr>
<td>18 - 25 years</td>
<td>28.8</td>
<td>34.0</td>
<td>31.4</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>32.5</td>
<td>44.8</td>
<td>38.6</td>
</tr>
<tr>
<td>45 - 65 years</td>
<td>41.5</td>
<td>52.2</td>
<td>46.8</td>
</tr>
<tr>
<td>65 - 75 years</td>
<td>41.3</td>
<td>56.0</td>
<td>49.1</td>
</tr>
<tr>
<td>75+</td>
<td>46.1</td>
<td>65.4</td>
<td>58.0</td>
</tr>
<tr>
<td>All ages</td>
<td>32.5</td>
<td>42.7</td>
<td>37.6</td>
</tr>
</tbody>
</table>

Source: Statistics Netherlands www.cbs.nl 18-3-2010
3.2. OECD Indicators for pedestrian handicaps

The so-called OECD Indicators for Quality of Life of pedestrians measure whether a person can perform relevant activities without trouble, with some trouble, with great trouble or not at all. The indicators include 7 activity types: 2 items on hearing, 2 items on vision and 3 items on agility\(^9\). In Dutch statistics composite indicators are provided for hearing, vision and agility limitations. The questions are asked to persons of 12 years and older. In the Netherlands the survey is performed continuously since 2001.

Like in the SF12 survey, there appears to be an age relation. The levels of impediment for hearing and eye sight problems are approximately the same and average less than 5% of the total population. At the age of 75 however, the share is more than 12% of the group. With regard to hearing, males have somewhat more problems than females. For eye sight females experience more problems. At 75 years of age twice as many females suffer from eye sight impediments than males.

In most cases, the three impediments are hardly noticeable from the outside. With growing age they very gradually appear. Its consequences are easily underestimated, both by the persons themselves and their environment.

Hearing, eye sight and agility problems all aggravate the risk of accidents. Hearing and eye sight limitations particularly diminish discerning risks of collisions with other road users. Eye sight and agility problems increase the risk of falling. All three will feed increasing insecurity feelings.

Agility is by far the most important problem, both in quantity and in quality. Approximately 8% of the total population experiences limited agility. At the age of 75 almost 40% of the group have agility limitations, but there is a striking difference between males and females. The incidence amongst females is more than twice as high (males: 23%, females: 48%). Limited agility makes it more difficult to react adequately in emergencies, which contributes to more serious consequences of accidents. The feeling of not being able to cope in emergencies can seriously restrict freedom of mobility. Many elderly back out of going out in the evening because of it (cited in Fyhri et al, 2010 are: Arfken et al, 1994; Martin et al, 2005).

<table>
<thead>
<tr>
<th>Age groups</th>
<th>males</th>
<th>females</th>
<th>males + females</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - 18 years</td>
<td>0,9</td>
<td>0,3</td>
<td>0,6</td>
</tr>
<tr>
<td>18 - 25 years</td>
<td>0,5</td>
<td>0,4</td>
<td>0,4</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>1,2</td>
<td>1,0</td>
<td>1,1</td>
</tr>
<tr>
<td>45 - 65 years</td>
<td>3,5</td>
<td>2,2</td>
<td>2,9</td>
</tr>
<tr>
<td>65 - 75 years</td>
<td>7,0</td>
<td>3,9</td>
<td>5,4</td>
</tr>
<tr>
<td>75+</td>
<td>13,0</td>
<td>12,5</td>
<td>12,7</td>
</tr>
<tr>
<td>All ages</td>
<td>3,1</td>
<td>2,4</td>
<td>2,7</td>
</tr>
</tbody>
</table>

Source: Statistics Netherlands www.cbs.nl 18-3-2010

\(^9\) The items are: following a group discussion; have a conversation; read small letters; recognise a person from a distance of 4 meters; carry a 5 kg load for 10 meters; bend to pick up an object from the floor; walk 400 meters without stopping.
### Table 8  The percentage of persons with limited eye sight - averages 2001-2009

<table>
<thead>
<tr>
<th>Age groups</th>
<th>males</th>
<th>females</th>
<th>males + females</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - 18 years</td>
<td>0,9</td>
<td>1,3</td>
<td>1,1</td>
</tr>
<tr>
<td>18 - 25 years</td>
<td>0,6</td>
<td>0,9</td>
<td>0,8</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>0,9</td>
<td>1,6</td>
<td>1,3</td>
</tr>
<tr>
<td>45 - 65 years</td>
<td>6,7</td>
<td>7,8</td>
<td>7,3</td>
</tr>
<tr>
<td>65 - 75 years</td>
<td>5,9</td>
<td>8,0</td>
<td>7,0</td>
</tr>
<tr>
<td>75+</td>
<td>7,9</td>
<td>14,9</td>
<td>12,1</td>
</tr>
<tr>
<td>All ages</td>
<td>3,7</td>
<td>5,1</td>
<td>4,4</td>
</tr>
</tbody>
</table>

Source: Statistics Netherlands www.cbs.nl 18-3-2010

### Table 9  The percentage of persons with limited agility - averages 2001-2009

<table>
<thead>
<tr>
<th>Age groups</th>
<th>males</th>
<th>females</th>
<th>males + females</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - 18 years</td>
<td>1,7</td>
<td>1,6</td>
<td>1,6</td>
</tr>
<tr>
<td>18 - 25 years</td>
<td>0,7</td>
<td>2,0</td>
<td>1,4</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>1,5</td>
<td>4,0</td>
<td>2,8</td>
</tr>
<tr>
<td>45 - 65 years</td>
<td>5,5</td>
<td>11,0</td>
<td>8,3</td>
</tr>
<tr>
<td>65 - 75 years</td>
<td>10,2</td>
<td>20,0</td>
<td>15,3</td>
</tr>
<tr>
<td>75+</td>
<td>22,7</td>
<td>48,3</td>
<td>37,9</td>
</tr>
<tr>
<td>All ages</td>
<td>4,8</td>
<td>10,7</td>
<td>7,8</td>
</tr>
</tbody>
</table>

Source: Statistics Netherlands www.cbs.nl 18-3-2010

### 3.3. Travel survey indicators

In 2004 in the Netherlands within the context of the national travel survey a special survey was carried out on experienced mobility handicaps (Socialdata, 2005). In earlier years the SF12 and OECD like indicators were used to estimate the number of mobility handicapped persons, but there were some doubts about the accuracy of those estimations for mobility impairment. Indeed, the results from the special survey in 2005 pointed to substantially lower numbers of mobility handicapped (6.1% of the Dutch population instead of the earlier estimations of 10 – 12% of the population that were communicated by the handicapped advocacy). The difference might however be explained by the less detailed questions (the disorders were not assessed separately) and the ‘natural’ attitude of the disabled to understate the severity of their mobility impediments.

In Table 10 the main results of the special survey are shown. The distribution across age groups shows some likeness to the SF12 and OECD Indicators study results. The share of persons younger than 65, however, is substantially lower. In the Socialdata survey only 2.4% of the mobility handicapped was younger than 65, 14.9% between 65 and 79 and 70% was 80+. Based on the SF12 and OECD Indicators data, the figures for persons younger than 65 years of age are most probably too low.

The age distributions from the Socialdata survey was used for forecasting the number of mobility handicapped in 2040. In table 11 the results are shown. Based on the shift in the distribution of age groups, the total number of mobility handicapped in the PQN countries will grow from an estimated 28.9 million persons in 2000 (6.3% of the population) to almost 50 million persons in 2040 (10.9% of the population, see also figure 1). In reality the numbers will probably 20 – 30% higher, depending on the definition of ‘mobility handicapped’.
Table 10 Mobility handicapped according to MON 2004

<table>
<thead>
<tr>
<th>Traffic handicapped</th>
<th>% in 2004</th>
<th>% of population group</th>
</tr>
</thead>
<tbody>
<tr>
<td>of which &lt;65</td>
<td>100</td>
<td>6,1% of the total population</td>
</tr>
<tr>
<td>of which 65 - 79</td>
<td>34</td>
<td>2,4% of persons &lt; 65 years of age</td>
</tr>
<tr>
<td>of which &gt;80 years of age</td>
<td>26</td>
<td>14,9% of persons 65 – 79 years of age</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>70,0% of 80+</td>
</tr>
</tbody>
</table>

Above 80 years of age 70% of the persons indicate that they have some mobility handicap. Observations in Delft and Rotterdam showed that almost all of them use some kind of walking aid, from a walking stick to electric scooters (source: interview Stefan van der Spek, 2010).

Table 11 Mobility handicapped persons in PQN countries (estimation based on NL-MON data)

<table>
<thead>
<tr>
<th>Age groups (x million persons)</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger than 65</td>
<td>9,3</td>
<td>9,3</td>
<td>9,3</td>
<td>9,1</td>
<td>9,0</td>
<td>8,8</td>
<td>8,5</td>
<td>8,2</td>
<td>8,0</td>
</tr>
<tr>
<td>65 – 79</td>
<td>8,3</td>
<td>8,6</td>
<td>8,8</td>
<td>9,5</td>
<td>10,2</td>
<td>11,1</td>
<td>11,9</td>
<td>12,5</td>
<td>12,6</td>
</tr>
<tr>
<td>80+</td>
<td>11,3</td>
<td>13,8</td>
<td>16,1</td>
<td>17,9</td>
<td>19,7</td>
<td>21,0</td>
<td>23,8</td>
<td>26,5</td>
<td>29,4</td>
</tr>
<tr>
<td>Total population</td>
<td>28,9</td>
<td>31,7</td>
<td>34,1</td>
<td>36,5</td>
<td>38,9</td>
<td>40,9</td>
<td>44,2</td>
<td>47,2</td>
<td>49,9</td>
</tr>
</tbody>
</table>

% of Mobility handicapped

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6,3</td>
<td>6,9</td>
<td>7,3</td>
<td>7,8</td>
<td>8,3</td>
<td>8,7</td>
<td>9,5</td>
<td>10,2</td>
<td>10,9</td>
</tr>
</tbody>
</table>

Source: Methorst, 2009

Figure 1 Trends in population group shares in PQN Countries
4. Mobility

In transportation literature, mobility is usually expressed in terms of passenger kilometres. Whilst for motor vehicles the major feature is how much distance is covered, for walking the major feature is connectivity and accessibility. Passenger kilometres do not reflect the essence of pedestrian mobility; the ‘production’ of kilometres on foot is not comparable with those of motorised vehicles, since the action radius of walking is only a fraction of the one of motor vehicles. For the PQN study a definition is chosen that reflects that mobility is basic for the functioning of citizens, a necessary condition for all other forms of person transport, and that the freedom to choose to travel and sojourn in public space is particularly important.

In the 1970’s Zahavi presented the UMOT (Unified Mechanism of Travel) principle. It was assessed that people appear to have a travel time budget of approximately 75 minutes per day (400 hours per year; Zahavi, 1979, Hupkes, 1977). This travel time budget has been constant over the years and implicates that a change in modal split towards more car use will go at the expense of other modes. Although mobility statistics are not conclusive on this point, it is clear that the time spent walking has decreased over the years. If in future years car dependence grows, it can be expected that the total time walking will further decrease. This does not mean however that the crucial pre-conditional role of walking will change.

Pedestrian mobility differs from other modes in a number of ways. The most significant feature is that walking is part of almost all other trips, the so called multi-modal walking. One has to walk to a car or public transport to be able to use it. After the car or public transport ride, one has to walk to the contemplated destination. Even trips by bicycle most of the times involve some walking in public space, be it less than for cars, because bicycles can be parked very close to the building or property one needs to access. Unfortunately most mobility statistics do not convey this obvious aspect of walking. In Dutch explorative research it was found that between 30 and 50% of the distance covered walking is multi-modal walking. The average citizen walks some 300 kilometres per year (800 meters per day) and spends at least 100 hours per year (15 – 20 minutes per day) in public space, not including waiting and sojourning time. Although this is not as much as time spent in cars (average 150 hours per year\(^\text{10}\)) it is still quite significant. Not representing this multi-modal walking means severely underestimating the importance of walking and the need for adequate facilities to accommodate walking in public space\(^\text{11}\).

In Table 12 and figure 2 and 3 indications are given about the real numbers of trips\(^\text{12}\) and time spent in traffic for walking in the Netherlands in 2007. The figures are corrected for underestimation of walking. For the estimations it is assumed that each car trip involves 180 meters of walking (at home 30 meters towards the car; 150 meters from the car to the final destination), a trip by train involves 1,300 meters of walking, a bus/tram/metro trip involves 950 meters and a bicycle/moped trip involves 80 meters of walking. These correction calculation factors are based on assessment by a UITP research group in 1997 and a limited validation study amongst 250 persons in 2005 (Methorst, 2005).

\(^{10}\) The Dutch Social and Cultural Planning Bureau finds that the average Dutch inhabitant spends 240 hours per year in the car; it is estimated that 25% of this concerns walking to and from the vehicle.

\(^{11}\) Updated estimations based on methodology used for the UITP Study ‘Transport demand not covered by international transport statistics’ (UITP, 1997) and data from the NL travel survey.

\(^{12}\) Regarding walking, a journey is a door-to-door trip. A journey can also be multi-modal, for example consisting of a (sub) trip on foot, a trip by vehicle, and again some walking. In that case by definition the main mode is not walking, but some vehicle.
Table 12  Corrected figures for walking (including estimates for multi-modal walking NL 2007)

<table>
<thead>
<tr>
<th>Share of walking in relation to total distance covered (kilometres)</th>
<th>units</th>
<th>per person per day</th>
<th>per person per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total distance covered in 2007 (all modes) in kms</td>
<td>187.440.132.155</td>
<td>31.4 kms</td>
<td>11.459</td>
</tr>
<tr>
<td>Total distance covered on foot in 2007 in kms</td>
<td>5.257.616.382</td>
<td>0.9 kms</td>
<td>321</td>
</tr>
<tr>
<td>of which in door-to-door trips</td>
<td>3.088.689.480</td>
<td>0.5 kms</td>
<td>189</td>
</tr>
<tr>
<td>of which in multi modal trips</td>
<td>2.168.926.902</td>
<td>0.4 kms</td>
<td>133</td>
</tr>
<tr>
<td>Total number of journeys</td>
<td>16.997.956.850</td>
<td>2.8 journeys</td>
<td>1.039</td>
</tr>
<tr>
<td>Total number of (sub)trips on foot</td>
<td>43.357.648.009</td>
<td>7.3 (sub) trips</td>
<td>2.651</td>
</tr>
<tr>
<td>Total number of journeys on foot</td>
<td>3.555.472.219</td>
<td>0.6 journeys</td>
<td>217</td>
</tr>
<tr>
<td>Total number of (sub)trips on foot</td>
<td>29.915.163.379</td>
<td>5.0 (sub) trips</td>
<td>1.829</td>
</tr>
<tr>
<td>Total travel time in minutes</td>
<td>448.907.752.791</td>
<td>75.2 minutes</td>
<td>457 hours</td>
</tr>
<tr>
<td>Total travel time in minutes on foot</td>
<td>105.152.327.637</td>
<td>17.6 minutes</td>
<td>107 hours</td>
</tr>
<tr>
<td>Share in % of distance covered of (sub) trips on foot</td>
<td>2.8%</td>
<td>(kms)</td>
<td></td>
</tr>
<tr>
<td>Share in % of (sub)trips</td>
<td>69.0%</td>
<td>(sub-trips)</td>
<td></td>
</tr>
<tr>
<td>Share in % of travel time of (sub) trips on foot</td>
<td>23.4%</td>
<td>(minutes)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2  Number of trips per mode (NL 2007)

Figure 3  Travel time per mode (NL 2007)
The above figures represent an attempt to provide ‘real’ figures. It is found that available mobility statistics are most probably biased regarding walking:

- Mobility data are collected primarily to gain insight in facts behind traffic and transport, particularly motor vehicle traffic and public transport and not so much in the ‘unproblematic’ walking. Data on walking are more or less a by-product. Interests like adequate public space management, support for public transport and health promotion however can be good arguments for shifting priorities regarding mobility data collection.

- In many travel surveys, children up to 12 years are not included, because it is relatively difficult to question them and get reliable answers. Even when children are included in the survey, the reports are often ‘second hand’ by their parents or guardians, who do not know about all independent walking trips their children make. The data on children’s walking are thus less reliable than first-hand reported adult person walking. It needs to be noted that children are almost totally dependent on walking. They walk more and more often pedestrians than most other persons.

- In many travel survey designs a minimum amount of distance covered is specified; in some surveys this means that walking distances less than 50 meters are not included. A substantial number of walks are very short, shorter than 50 meters, but relatively large in number, thus in total taking up a substantial share of time in traffic exposure.

- Multi-modal walking is poorly reported, in some cases because it is not asked or even excluded, in other cases because the respondents tend to ‘forget’ that they walked towards and from their ‘main mode’. Because of this, figures for multi-modal walking need to be estimated properly. A relatively reliable method is to calculate walking kilometres by multiplying the number of car and public transport trips by measured average walking distances to and from those modes. The factors, however, need to be validated in specific cases, because they probably vary for countries, urbanity, cities and cultures.

- Although data on mono-modal (door-to-door) walking are relatively reliable, it can be expected that particularly very short trips, like trips to the mailbox, to the neighbours, to the children’s playground across next doors or across the street, will be underreported. It can be assumed that the effect on the total distance covered will not be substantial, but the effect on the reported number of trips can be significant.

- In most travel survey designs data on trip distances and travel times are based on respondent estimations, not on measured distances or recorded travel time. From validation studies it appeared that most of the times the reported distances are not very accurate. Modern survey techniques, like GPS tracking, can remedy this problem.

- Survey designs and definitions vary for countries; particularly figures regarding walking are not comparable. For example: in some travel surveys (like in Spain) walking and cycling is recorded as one mode. Modern GPS tracking methods with a follow-up questionnaire (Van der Spek, 2009) and composite travel survey – indicator check and correction calculations, are expected to result in more accurate data.

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13 This method was applied to Dutch travel survey data to calculate the ‘real’ walking mobility, which is considered to be a ‘best guess’ with approximately 10% margins.

14 A good indication for the inaccuracy of the estimations is that average travel time in two independent and parallel surveys in the Netherlands on mobility (OVG) and on time spending (TBO) give very different results. Both are based on stated behaviour by the respondents. For 2000 figures for number of trips are 2.41 in TBO and 2.58 in OVG. The TBO figure for travel time is 72.2 minutes; the OVG figure is 52.3. Another indication for the inaccuracy of the respondents estimations are highly improbable walking speeds of less than 1 km/h for walking to and from work (MON, 2007)
Keeping the above mentioned potential biases in mind, some characteristics of walking can be deduced from travel survey data on mono-modal walking trips.

The majority of pedestrian trips are quite short. In Switzerland, for example, the Microcensus on Travel Behaviour (2005) determined that 60% of walking trips in that country did not exceed 1 km, and only 10% of them exceeded 2 km. The average journey on foot in Sweden, as determined by the National Travel Survey (RES 2005-2006) is somewhat longer at 2 km, however when compared with the average journey there by car (drivers 30 km, or passengers 41 km), bus (26 km), or bicycle (4 km), walking distances are still relatively short (Peddie, 2009). Figure 4 displays an example of the distribution of journeys by journey distances from Dutch travel survey data (MON 2007). The figure shows that in the Netherlands the most common reported walking distance is 1 – 2.5 kilometres. Shorter trips seem to be less common.

Figure 5 shows that, at least in the Netherlands, the number of mono-modal walking trips made by Dutch citizens increases with the level of urbanisation. Individuals, living in very urban areas, are found to walk more often than individuals that live in rural areas. The distribution of average distances per person per day covered on foot shows the same pattern. In very urban areas the average distance per person per day on foot is 840 meters; in rural areas the average is 580 meters. This means that citizens in very urban areas do not only walk more often and more, but also that the average distance per trip is slightly longer (1.270 meters instead of 1.18 meters).

Children walk more often than any age group. This is illustrated by figure 6. In the Netherlands, from the age of 12 years riding a bicycle becomes more popular than walking. In most other countries this shift is not so drastic and clearly marked. On the whole females tend to walk more than males. This is particularly true for the age groups of 20 – 64 years of age. Women use the car less than men.
With regard to modal split and the share of walking in it, there are vast differences between countries. In Australia, the United States and Canada for example the modal share of walking is below 10% of the trips. In Switzerland however, the share of walking is as high as 45%. In the Netherlands it is 22%, but here also cycling amounts to 25%. The average share of walking in the PQN countries is approximately 22%. The average modal share of the bicycle is 7%. The modal share of the car (as main mode) is on average 60%. In Australia, the USA and Canada the modal share is above 80% of all trips (Cabello et al, 2010).
The ADONIS study (1998) shows that there are big differences in modal split between European cities. In some, like Amsterdam, Groningen, Delft, Copenhagen, Mataro and Vittoria walking and cycling take up approximately 50% and more of all trips. In others, like Barcelona, Arhus, Odense, L'Hospitalet and Brujas the share is approximately one third. On the low end Brussels and Gent appear with 17 and 10% respectively\(^{15}\).

In general, leisure and recreation, shopping, conducting personal business, and education are the highest ranked among the purposes of walking. In figure 6 the example of the ranking of trip purposes in the Netherlands is displayed.

\[
\begin{array}{cccccccc}
\text{Touring and walking} & \text{Shopping trips} & \text{Social and recreational trips} & \text{Visiting trips} & \text{Education trips} & \text{To and from work trips} & \text{Services and personal care trips} & \text{Business trip} \\
\text{Percentage of kms on foot} & & & & & & & \\
0.0 & 5.0 & 10.0 & 15.0 & 20.0 & 25.0 & 30.0 & 35.0 & 40.0 & 45.0 & 50.0 \\
\end{array}
\]

Figure 7 Distances covered on foot by travel purpose (NL, 2007)

The trip purposes, however, tend to fluctuate when demographic variables, such as age, are factored in. According travel surveys the main walking purpose for children under 5 year is to accompany someone else, while education is the dominant purpose for those between the age of five and twenty-four. In contrast, the priority for people aged twenty-five to thirty-four is work, whereas for those aged thirty-five to seventy-four, it is recreation. Finally for those aged seventy-five years and above, the dominant walking trip purpose is shopping (Peddie, 2009).

People’s behaviour emerges in interaction between the person and the environment. The decision to walk or not to walk is influenced by individual factors as well as by their perception of the physical and social environment (Fyhri et al, 2010). Within the PQN Working Group 2 Fyhri et al explored to what extent perceived safety influences peoples mobility and walking decision before they decide to move (strategic decisions) and while in traffic (tactical and operational decisions). They conclude:

“Although both anecdotal evidence and some single studies indicate so, the bulk of proper executed empirical research concludes that there is little relationship between perceived safety and security and the strategic decision to walk, in other words the modal choice situation. Apparently, there are other important parts of the perceived physical and social environment that essentially influence the decision to walk. Results also indicate that

\(^{15}\) Currently in Belgium the modal share of walking is larger.
people express a higher degree of worry when at home (strategic situation) than when they are using a certain mode of transport (operational situation). Still, for some groups, and in some situations, feelings of unsafety might influence people’s decision about whether to walk or not.

There seem to be considerable national and regional differences in how perceived safety influences children’s opportunities for walking in everyday life. In some inner city areas, especially in large cities, fear of crime or fear of accidents might give considerable limitations to children’s independent mobility. In more rural areas and especially in Northern Europe, this seems to be a more marginal explanation.

Once the pedestrian has made the strategic decision to walk, perceived safety plays a larger role. Multivariate analyses have shown that when everything else is controlled for, pedestrians who are afraid of crime and threats tend to do more behavioural adaptations, like choosing another route etc, than others.”

5. Sojourning in public space

Sojourning in public space concerns all pedestrian activities in public space that are not purposeful walking from an origin to a destination or a round trip like walking the dog. Sojourning in public space is important because it is an indicator for quality of public space. People in the street, means business for shops, safety and security for all because of common supervision and that it is a place to be for inhabitants and tourists. By making public space attractive, it also supports property value and helps attracting people from the outside (Project for Public Spaces, 2010). Well-designed public open space (POS) that encourages physical activity is a community asset that could potentially contribute to the health of local residents (Giles-Corti et al, 2005).

There are many kinds of sojourning. It can concern professional activities, like selling goods, policing or supervising the area, doing public space maintenance or delivering post or newspapers, playing music for other sojourners. Other sojourning activities are: children playing, window shopping, enjoying the sun, doing gymnastic exercises, waiting for the bus, taking part in parades and street festivals, talking to the neighbours, having a break from the office, ‘hanging out’ of youngsters, washing the car etc. Furthermore, public space is also the home of the homeless and sometimes the scene of violence and crime.

The concept of ‘sojourning’ is virtually unknown in Anglo-Saxon literature, but it is quite common in Dutch (‘verblijven’), German (‘verbleiben’, ‘Aufenthalt’), French and Swiss (‘séjour’ and ‘zone de rencontre’) articles on pedestrian activities. Anecdotal in this respect is the reaction to the introduction of the concept at a lecture at the University of South Carolina, where a person in the audience exclaimed ‘In the USA we call that ‘loitering’ and you can get fined for that’. The audience however accepted that the concept fits nicely in the Obama administration’s new transport policy target of liveability (Methorst, 2009). The PQN Working Group 4 acknowledged both the unfamiliarity and the importance of the concept and supports the general introduction of the concept in the scientific and political communities (WG4 minutes August 2009).

Although almost everyone knows that many important things happen in public space, very little data is available about time spending in public space. Even in time spending surveys and statistics no clear indication was found on the amount of time that is spent in public space. Only in very specific cases, like festivals, protest parades, football matches some observations are made in this regard. As a consequence, the value of sojourning in public

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16 In most travel surveys professional frequent walking like delivering mail and newspapers on foot are excluded from the survey.
space tends to be underestimated or even denied and investments in public space quality, and the promotion of sojourning in public space, lag behind.

From time spending and leisure time studies some indications of the order of magnitude and time characteristics can be deduced. From time spending surveys in the Netherlands it is known that the amount of leisure time spent outdoors decreased from 14.8 hours per week in 1975 to 13.3 hours per week in 2000. Most leisure travel takes place on Sundays (21%) and Saturdays (18%). The rest of the weekdays are good for 12 – 13% of the trips. In 2001 and 2002 almost a billion daytrips (more than 2 hours from home, excluding trips of more than 500 km and walking trips) were made by the Dutch population, which equals about 60 daytrips per capita (Harms, 2006; Harms, 2008). Of these trips 430 million concerned some form of sojourning in public space. It can be calculated that, if 50% of these trips concern sojourning in public space, in total some 2 hours per person per week are spent sojourning in public space for leisure purposes (about 100 hours per year). Sojourning in public space for other reasons (waiting, lunch hour time, playing outdoors, hanging out, professional activities) will probably be just as much. Consequently, the total amount of time spent sojourning in public space will average approximately one hour per person per day. This is about as much time as is spent walking.

It can be expected that the actual amount of sojourning is determined by a number of factors, such as:

- **Culture**: in open, communicative cultures it is more attractive to be amongst others than in more closed cultures
- **type of residence**: apartment building residents generally do not have a garden to ‘hang out’ and tend to be in public space more than residents of homes that have a garden.
- **Urbanity**: city dwellers have more opportunity to find people in public space than village dwellers
- **attractiveness of public space**: cities that are dominated by parked cars attract less people in public space than cities that restrict car parking and promote sidewalk cafés etc.
- **climate and weather**: in a sunny, Mediterranean climate being outdoors is much more agreeable than in cold countries. During rain people flee towards shelter etc.

### 6. Safety and security

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. Note that traffic safety is a special class of safety, which restricts inclusion of pedestrian safety to accidents where at least one moving vehicle is involved. In the current paper pedestrian safety is taken in the broadest sense, including all other (potential) accidents and harmful incidents that can happen to a pedestrian in public space.

Security is a condition, where one is protected against danger from the outside. The dangers are usually related to criminal activity, harassments or threats. The difference with safety is that safety does not focus on threats from the outside: a person can act unsafe himself.

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17 The activities that include some form of sojourning in public space are: outdoor recreation (28.6 million trips), walking (65.9 million trips), funshopping (112.8 million trips), public events (42.3 million trips), visiting heritage estates and areas (28.9 million trips) and ‘various others’ (156.0 million trips), totalling 434.5 million trips of total 981.6 million trips (source: Harms, 2006, table 6.2, page 85).
As walking is the only mode that is (or should be) open for all persons, the safety and security of pedestrians must always be seen within the context of mobility and accessibility. If danger, whether it is actual danger or perceived danger, inhibits mobility or accessibility, the consequences outreach ‘normal’ individual risk consequences. In the past safety was sometimes achieved by excluding pedestrians and/or making places inaccessible for them at the toll of great social costs.

In practise (local) authorities are or can be informed about traffic safety and security issues in their jurisdiction. The main source on traffic safety information is accident data, through statistics or directly through the police. Information about security issues comes from the police, security firms (CCTV and surveillance) and the media.

As regards pedestrians, the common definition of traffic accidents falls short. The sizable issue of single pedestrian accidents (see below) is not covered in this definition, because there is no moving vehicle involved. Consequently these accidents will not be paid proper attention to in road safety research and policy development, although the managers of public space (government) do have policy responsibility. This study therefore aims to picture an image of all travel accidents in public space, including accidents without involvement of moving vehicles.

Road traffic accident reporting has serious limitations. SWOV research from 1989 already pointed to the fact that a part of the accidents and victims do not show up in statistics. Pedestrian and bicyclist accidents are less well covered than motor vehicle accidents (Harris, 1989). Because of societal relevance, the Dutch Minister of Transport decided for National Targets no longer to rely on single source accident reporting, but to use ‘real’ numbers of victims, based on multiple sources. This example is now followed by 11 of the 22 IRTAD countries that completed the IRTAD questionnaire on underreporting of traffic accidents (Derriks & Mak, 2007).

Methorst et al (2010) wrote an advisory report for the Dutch Ministry of Transport on the ‘real’ number and severity of pedestrian and bicyclists’ accidents, relative to other travel accidents. In this report also some insight in general characteristics of the accidents is offered. It leads to a surprising image: most victims amongst pedestrians and bicyclists come from single accidents, without involvement of a motor vehicle. This study shows that in the Netherlands the most important types of accidents according to volume are: single bicycle accidents, single pedestrian accidents, pedestrian crossing accidents, bicycle crossing accidents, pedestrian and bicycle accidents near public transport stops and trains crossings. Little is known about the circumstances, causes and possible measures to be taken.

The study also shows that almost 40% of all societal costs from travel accidents are related to bicycle and pedestrian accidents. The costs are so high because particularly the number of treatments in Emergency Rescue departments of hospitals and number of hospital admittances are extremely high. Government is confronted with high medical costs, costs of employment disabilities, transport costs within the context of the Social Support Act etc.

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18 For example: in the city of Chapel Hill (USA, North Carolina) a pedestrian crossing over a major collector road was declared a no-go zone for pedestrians. Consequently school children had to take a bus to cover the 400 meters distance, which takes them some 30 minutes and takes up a substantial amount of tax payers money. Other examples: fences to prevent road crossing (on main roads a relatively common practise in the UK) and causing detours of several 100 meters, making destinations at the other side unreachable for the elderly.
Table 12  Average number of victims per year (2003 – 2007) – ‘real’ numbers per million inhabitants

<table>
<thead>
<tr>
<th></th>
<th>Deceased excl. deceased</th>
<th>Hospitalised excl. deceased</th>
<th>Urgent Medical Assistance excl. Hospitalised</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrians</td>
<td>9</td>
<td>320</td>
<td>3,050</td>
<td>3,380</td>
</tr>
<tr>
<td>Of which single accidents</td>
<td>3</td>
<td>250</td>
<td>2,825</td>
<td>3,070</td>
</tr>
<tr>
<td>Of which traffic accidents</td>
<td>6</td>
<td>75</td>
<td>230</td>
<td>310</td>
</tr>
<tr>
<td>Bicyclists</td>
<td>14</td>
<td>470</td>
<td>3,700</td>
<td>4,175</td>
</tr>
<tr>
<td>Of which single accidents</td>
<td>3</td>
<td>370</td>
<td>2,925</td>
<td>3,300</td>
</tr>
<tr>
<td>Of which multiple vehicle</td>
<td>10</td>
<td>100</td>
<td>780</td>
<td>900</td>
</tr>
<tr>
<td>Other modes</td>
<td>37</td>
<td>500</td>
<td>2,950</td>
<td>3,500</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>1290</td>
<td>9,700</td>
<td>11,000</td>
</tr>
</tbody>
</table>

NB. The numbers are rounded and corrected for doubles

Table 13  Summed travel accident cost (x million Euros, rounded)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Per inhabitant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Killed persons</td>
<td>Hospital admittance</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>2,065</td>
<td>130</td>
</tr>
<tr>
<td>Bicyclist</td>
<td>2,920</td>
<td>180</td>
</tr>
<tr>
<td>Other Modes</td>
<td>3,895</td>
<td>240</td>
</tr>
<tr>
<td>Total</td>
<td>8,880</td>
<td>545</td>
</tr>
</tbody>
</table>

The magnitude of the number of injuries due to falls is also confirmed by the recent Apollo project and VTI studies\(^{19}\). In the Apollo project it was estimated that in Europe 1.6 million pedestrians get injured due to falls on public roads in the European Union per year (Körner and Smolka, 2009). This represents almost 3,000 victims per million inhabitants. The figures relate to the number of injured that urgently needed medical assistance (c.f. Table 12, 3\(^{rd}\) column figures). For the Netherlands the Apollo study uses the same source as the Methorst et al study. Methorst et al argued that even this figure probably represents an underestimation, as (in the Dutch case) for 43% of the victims the location is coded as unknown. In table 12 the figures are corrected for this underestimation.

The VTI study by Öberg showed similar results for Sweden with 85% of injured pedestrians (in this case hospital admittance severity) due to pedestrian only events; in Sweden there are about 9 times as many casualties due to falls compared to traffic accidents. This higher incidence ratio is most probably due to winter conditions in Sweden that are more risky than in the Netherlands. A good indication for this conclusion is that in the severe winter of 2009-2010 in the Netherlands 8 times as many casualties were reported as in the same period during the last 5 years (Draaisma, 2010). Apart from that, little is known about the circumstances, because medical databases, apart from basic personal particulars, do not cover information about factors that might have caused the incident.

Both the Apollo report and the Dutch report showed that in numbers of pedestrians that needed urgent medical assistance, children (0-14) and the elderly are especially affected by fall injuries. More than three quarter of all pedestrian injuries happen during general walking around, 9% of the pedestrian injuries happen during other activities, 6% during play and leisure activities, 4% during sports and athletics activities, 2% during shopping and 1% during activities such as eating or drinking.

\(^{19}\) The Apollo project concerns an EU project on “Strategies and best practices for the reduction of injuries”; work package no. 5 concerned “Initiatives for interventions of the public health sector to prevent unintentional injuries among vulnerable road users”.

The VTI study was carried out by Gudrun Öberg and concerned injured pedestrians in Sweden.
With regard to risk per person to be admitted to hospital after a fall accident, the picture is quite different. Here it shows that the risk increases dramatically with age (see figure 8). Dutch inhabitants of 75 and over run 6 times more risk than the average Dutch inhabitant, and 19 times as much as 18 – 24 year old persons. This profile is probably valid for most countries.

![Figure 8](image)

**Figure 8  Risk of fall incidents - hospital admittances per million inhabitants per year by age groups (NL, 2006/2007)**

The severity of the injuries of pedestrians that are admitted to hospital due to a fall incident differ somewhat from those of traffic accident casualties. The general profile of hospital admittances due to falls shows slightly less persons that are slightly or moderately injured, but substantially more in the severe category. The percentage of victims in the categories serious, critical and fatal, however are substantially lower. This can be explained by the lesser amount of outside force during the incident (see figure 9).

For traffic accidents the IRTAD database is a much used international source. It includes data on reported pedestrians accidents and casualties. The data is however not corrected for underreporting, so the real numbers of victims will be substantially higher. Dell'Asin (2008) processed the available data on pedestrian accidents in PQN countries. In Table 14 shows the number of fatalities and injured pedestrians per million inhabitants per country.

For the OECD Working group on Pedestrian Safety, Urban Space and Health Papadimitriou carried out an analysis of traffic accidents data of OECD Countries. She found that, contrary to other road users, the majority of fatalities (65%) amongst pedestrians happen inside urban areas. Also, the majority fatalities (50%) happen during darkness, approximately 40% during daylight or twilight, whilst from 8% of the fatalities the light condition during the accident is unknown. For other road users the situation is about reverse.
B.5.9. Evaluation of the pedestrians’ performance and satisfaction

With regard to causes of the high pedestrian crash rate, SWOV argues that walking is an important form of mobility for everyone, particularly for the young and the elderly. It is a mode of transport where people are unprotected and move through traffic at low speed and mass. This makes pedestrians vulnerable – by definition, collisions with other road users will have serious consequences for the pedestrians (Wegman & Aarts, 2006, SWOV, 2009).

Regarding age distribution, fatal traffic accidents follow the same tendency as found for fall accidents, be it somewhat less extreme. The risk of the elderly (65 and older) is about 5

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Table 14  Pedestrian casualties per million inhabitants in EC-19 Countries (PQN Countries)

<table>
<thead>
<tr>
<th>Country</th>
<th>Fatalities – pedestrian per million inhabitants</th>
<th>Injured pedestrians per million inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1997</td>
<td>2006</td>
</tr>
<tr>
<td>AT</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>BE</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>CZ</td>
<td>41</td>
<td>20</td>
</tr>
<tr>
<td>EE</td>
<td>52</td>
<td>45</td>
</tr>
<tr>
<td>FI</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>FR</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>DE</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>HE</td>
<td>38</td>
<td>24</td>
</tr>
<tr>
<td>HU</td>
<td>43</td>
<td>29</td>
</tr>
<tr>
<td>IL</td>
<td>31</td>
<td>20</td>
</tr>
<tr>
<td>IT</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>NL</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>NO</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>PL</td>
<td>71</td>
<td>46*</td>
</tr>
<tr>
<td>PT</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td>ES</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>SE</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>CH</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>UK</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>EU-19</td>
<td>24</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: Dell'Asin, 2008
times the risk of the average and approximately 9 times as high as the risk of a child (17 years and younger). For non-fatal pedestrian traffic accidents, where the pedestrian is admitted to hospital, the differences are less extreme. In the Netherlands in 2007 the average number of hospital admittances due to a pedestrian crash was 75 admittances per million inhabitants. For the elderly (65+) the rate was 126 and for children (0 – 17) the rate was 101. In the SWOV Fact sheet on pedestrians the relatively high crash rates of children are explained as follows (cited from SWOV, 2009):

Children
Children are not small adults. They must literally learn step by step; they are also not able to apply everything they learn immediately or faultlessly. This also applies in traffic. The reason for this is the physical and mental (cognitive) development process that children undergo whilst maturing into adults (Rijk, 2008). It is also evident that the skills of young children in particular, which are important for crossing roads safely, are still insufficiently developed, such as observation skills, perception of dangerous locations, and information processing (Dragutinovic & Twisk, 2006). Children are only fully able to select the information needed to carry out the task of crossing the road from the age of eleven. The SWOV Fact sheet Road safety of children in the Netherlands shows that as pedestrians, children are less of a road safety problem than as cyclists.

The Elderly
Davidse (2007) shows that the most important cause of high risk to elderly pedestrians is their greater physical vulnerability (see also the SWOV Fact sheet The elderly in traffic). Functional limitations can also influence their road safety. For example, when crossing the road the following factors are important: elderly pedestrians tend to walk slower than the young, they have a longer start-up time, they are less capable of detecting approaching vehicles and estimating their speed, and they notice vehicles approaching from the side less quickly due to their more limited peripheral vision and less flexible neck movement, plus the fact that, due to slower reaction time and motor skill dysfunction, they can evade their crash opponent less quickly.

From analysis of Dutch data it appeared that the vast majority (75%) of pedestrian casualties of traffic accidents (admitted to hospital and fatalities) were involved in crossing accidents. In the 80s the French Institute National de Recherche sur les Transports et leur Sécurité (INRETS) developed the definition of typical accident scenarios. For pedestrian accidents 20 typical accident scenarios were developed. This work was recently updated. Four main categories were identified: accidents during crossing (total of 62%; two subtypes: detection problem (32%), anticipation problem (30%)), accident on pavement out of crossing (14% of accidents), accident where pedestrian is 'collateral damage' (7% of accidents) and particular context accidents (1.5% of accidents) (Brenac et al, 2003).

In the context of the PQN project De Goede researched the issue of pedestrian road crossing. She argues that there are three factors especially relevant: conviviality, conspicuousness and convenience. Convivial means that walking facilities should be safe and inviting, that is pleasant to use. Conspicuousness relates to the important aspect of comprehensibility of walking facilities; crossing facilities should be clear and legible. Convenience concerns the degree to which crossing facilities fit the usability needs in terms of number and quality. Based on these criteria and on what we know about the functional abilities of different pedestrian groups, requirements for safe and convenient crossing facilities can be developed. The design of pedestrian (crossing) facilities should, whenever possible, be aimed at pedestrians with the lowest level of ability, or adaptable to specific (dis) abilities (e.g.: dynamic traffic light duration) in order to ensure pleasant and safe conditions for all pedestrians (De Goede et al, 2010).
Security is a fundamentally different issue. Here the number of incidents is less important than the fear and emotions it evokes. Compared to traffic accidents and falls, the actual risk on getting injured or killed in a criminal incident often is substantially lower. Risk perception, however, is much more at hand. Particularly during dusk and night time, the fear of getting robbed, molested, assaulted and raped is substantially greater than the fear of getting involved in an accident, particularly amongst females and the elderly. According to national statistics the real number of criminal acts in public space is stable over the years\textsuperscript{20}. The perception of most people, however, is that society is getting more criminal by the year. This is fed by modern communication via the media, political focus on security, the appearance of CCTV cameras (‘it must be dangerous here’) and private discussions. Fear is a reality that needs to be taken into account, because it takes away people’s freedom of mobility.

When threatened by miscreants, pedestrians are the most vulnerable public space users, because they are not protected by a sturdy cage like that of a car and a public transport vehicle. Bikers can get away quickly. Security is a complex issue, and the pedestrian is quite sensitive to many factors affecting the perception of security: legal framework on crime and vandalism, surveillance and police presence, social features of the area (sense of place, social ties and integration, solidarity etc.), urban facilities (lighting, street furniture, landscaping) and urban features (density, land use, street layout) (Martin, 2010). According to Green (cited in Fyhri et al, 2010) the two most important factors regarding the perception of risk are the visual field (how much can I see?) and the visual control (can I be seen?).

Some important findings from literature regarding traffic safety, security and walking and sojourning decisions by Fyhri et al (2010) were:

- In general, unsafe roads are often considered as one of the main factors hindering walking and cycling
- If people could choose their mode of transport based on their own preference in a situation where cars do not cause unsafe or unpleasant situations, the volume of walking and cycling would most probably increase substantially
- The relation between perceived safety and security and walking seems not to be very strong, but people that perceive their neighbourhood as safe are more likely to walk
- Fear can have a very direct impact on the decision to walk as it can lead to the exclusion of certain transport modes. Fear for crime is often related to being outside and having the perception of being vulnerable. Handicapped people have a fear for crime when using public transport
- The decision whether to use public transport or not, is based on assessment of the whole trip, including walking to and from the bus stop or train station
- Being a pedestrian plays an important role in the negative feelings and the final decision about using public transport
- Having been involved in an accident often causes reduction or change in mobility
- Although the importance of independent mobility of children for their general development has been generally acknowledged, children are more and more restricted in travelling alone. This is often based on feelings of fear of the parents
- In rural areas road safety plays an important role, while in urban areas fear for crime is more important in the parents’ decisions on independent travelling of their children
- Any measure aimed at increasing walking and cycling for children via improved traffic safety will only be effective if parent’s experiences of traffic safety is improved
- Walking alone is often perceived as more dangerous than in a group.

\textsuperscript{20} See for example http://www.homeoffice.gov.uk/rds/soti.html for UK crime data over the years 2002 – 2006.
• Main factors in choosing a certain route are time use (38%), walking distance (33%) and the surroundings (15%). The most important factor to explain walking was to feel safe and secure (Ovstedal & Ryeng, 2002, cited in Fyri et al, 2010).

• For the elderly, walking is a way to maintain their mobility and overall health situation. Their walking behaviour is different from other pedestrians because of age-related individual characteristics like walking speed, need for assistance, limited mobility and the fear of falling

• The most important reason for older people to cross where they are (not using a special pedestrian crossing) is because it is inconvenient or difficult to make a detour

• In a random sample of elderly between 65 and 80 years old in the United States, 9% reported a serious fear to fall. Although more women than men reported fear, for both groups the fear of falling increased with age. As a result they seldom left the building where they lived (Arfken et al, 1994, cited in Fyri et al, 2010).

7. Satisfaction

According to Risser & Kaufmann 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 (Risser & Kaufman, 2010). Clearly, satisfaction and fear (perceived un-safety and insecurity) are different things. The question is what qualities satisfy people and also how much effort people take to be satisfied.

With regard to walking and sojourning the experience\[21\] is that people do not often express their satisfaction. Satisfaction points to conscious perception; because walking is such a common activity, it is not unlikely that feelings about walking are predominantly neutral. If asked, people will probably tell you both about the positive and negative experiences. It is known that some vulnerable groups do not volunteer their dissatisfaction or that they have trouble coping: they do not want to be labelled as vulnerable or weak. This is particularly true for the elderly and the handicapped: they have their pride.

There is little research carried out on pedestrian satisfaction; there is, however, some information about what dissatisfies people, particularly from complaints that local authorities and NGO received via hotlines, questionnaire or internet sites.

One example of such information is the report on a diary survey on walking by the Dutch Pedestrians Association. The study included questions on walking experiences and satisfaction. Almost 30% of the respondents complained about sidewalk conditions, 8% about traffic safety and 20% about various other matters. Dog excrements were a number one annoyance (Knippenbergh, 1993).

In the same survey questions were asked about the respondent’s most agreeable and least agreeable trips in the week preceding the survey. For ‘most agreeable trips’, walking trips score highest (41%) followed by bicycle trips (38%), public transport (12%); only 12% of the respondents mentioned a car trip as the most agreeable one during the survey week\[22\]. For the most unpleasant trip the scores were 38% for a walking trip, 27% for a bicycle trip, 12% for a public transport trip and 22% for a car trip. Apparently walking, when explicitly asked for experiences, evokes intense most positive and negative feelings.

\[21\] The author worked for 10 years at the Dutch Pedestrians’ Association.

\[22\] There could be some bias here, because the Pedestrians’ Association was the sender...
Another example of satisfaction information is provided by Goudappel Coffeng, a consultancy firm that counsels municipalities on public inquiry procedures for town renovation projects. In this context this agency designed and hosted websites that citizens can use to submit their statements. For the PQN project a selection of in total 314 statements regarding walking and cycling issues of 9 projects was delivered. Some of the entries are more than 250 words and covered multiple issues.

In total there were 222 entries about infrastructural issues. 31 of them concerned inadequate pedestrian facility availability and 17 inadequate quality of the pedestrian facilities. There were 20 entries about inadequate bicycle facility availability and 17 about their quality; regarding non-motorised traffic there were 25 entries about inadequate quantity and 22 about inadequate quality.

Other entries concerned rule-following (32 x speed limits, 20 x parking, 1 x pedestrian priority), safety (52 x traffic speeds and 61 x crossing), communication (20 entries).

Other (general) satisfaction surveys yield listings that particularly concern ‘small’ sufferings like dog excrements, graffiti, urinating in public, degeneration, street litter, speeding cars and mopeds, unsavoury persons, loitering youngsters and have a negative impact on people’s safety and security perception. It is striking that the aspects people communicate are mainly about operational nuisances and that hardly anyone mentions inadequate tactical or strategic level deficits, like network deficiencies, dysfunctional distribution of services etc. Apparently higher level dissatisfactions are only noticed by experts.

It is common knowledge that the media influence people’s image and expectations regarding the real world, and thus feel feelings of satisfaction and dissatisfaction. For most citizens media are the major source of information. Politicians have more sources, but even for them the media are main source of signals of satisfaction and dissatisfaction.

The media aim to bring news and entertainment, which means that they tend to focus on the unusual, the unexpected and the dreaded, and concentrate on manageable issues. The media are not obliged to give a true overall picture. In principle everybody, including the media, prefers juicy, remarkable stories over common facts and plain reality, but the magnitude of these stories distorts the image of reality. Neutral satisfaction / dissatisfaction is probably not a strong drive for change. As walking is the opposite of ‘new’, ‘remarkable’ and ‘dreaded’, this might explain why there is so little in the media about walking and there is so little attention for the walking environment, apart from the truly remarkable exceptions where dread is imminent or overwhelming.

8. Conclusions and recommendations.

With regard to walking and sojourning it appears that a major issue is that demonstrable serious problems and deficits are partly or totally hidden from public, scientific and political attention. Important problems with regard to pedestrian performance and satisfaction are:

- A large number of people has trouble performing ‘normal’ walking and sojourning tasks. About 50% of the population has limited abilities and about 10% of the population has severe difficulties walking and sojourning in public space.

  Because of the ageing of the population their number will double in the next 20 years; if adequate facilities are not offered to support independent mobility for vulnerable groups, it can be expected that the consequential social and service costs will dominate public costs.

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23 From the Dutch cities Boxtel, Deventer, Duiven, Heiloo, Maarssen, Maastricht, Olst/Wijhe and Uithoorn. The cities are spread out evenly over the country. The projects concern works in the period of 2006 – 2009.
spending and hamper general operational performance; adequate pedestrian facilities are now still affordable, and it is expected that investing in proper facilities and services sooner is much cheaper than doing it later.

- Through systems thinking and quantifying relations it is demonstrated that walking and sojourning delivers an essential contribution to mobility of the population. Currently there is too little awareness that without walking the transportation system, including car use, is not possible.

- The current image of what safety and security of walking and sojourning is about, needs to be adjusted. In objective terms the dominant safety issue is falling incidents; it can be argued (and calculated) that about half of the health care costs from mobility related accidents are caused by falls; without proper attention, because of the ageing of society, these costs will double in the coming 20 years.

- In 6 out of 9 fatal pedestrian accidents moving traffic is involved. The death toll per country varies from 9 per million inhabitants in the Netherlands to more than 46 in Poland.

  For injury accidents however the single accidents dominate. It is found that the total incidence of pedestrian of severe injuries is at least 320 per million inhabitants per year (±175,000 severely injured Europeans). Of this, 250 per million casualties result from falls (±135,000 Europeans) and 75 per million from pedestrian vehicle collisions (±27,000 Europeans). The total number of injured pedestrians per year is ±1.6 million Europeans.

- Awareness about the state of affairs regarding walking and sojourning and trends need to be raised urgently. The discrepancy between facts and perception needs to be bridged. The vicious circle of no data – no awareness – no priority - no research – no data needs to be broken. The lack of data and information on walking and sojourning is imminent; Crucial concepts and statistical units need to be redefined. In this context mobility needs to be defined as freedom of movement and not as distance covered; multi-modal walking needs to be highlighted; the definition of traffic accident needs to be changed to travel accident; ‘time spending in public space’ and ‘pedestrian satisfaction’ need to be assessed and statistically documented.

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Identification of compliance and satisfaction mechanisms

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'Never impose on others what you would not choose for yourself'
Confucius

Summary

The paper starts with an explanation why compliance and satisfaction are belonging together and why it is an advantage to reward walking. The importance of preconditions in this relation and especially how preconditions are perceived will be discussed in the next chapter. The role of reinforcement (reward/punishment) for compliances and its connection to satisfaction is another issue that is looked at. Finally how to enhance compliance especially in relation to walking and problems which are occurring will be discussed. This chapter closes with some suggestions what people in different roles could do to give walking more weight.

1. Introduction

Compliance means acting in accordance with established guidelines, specifications, legislation, norms etc., or trying to do so. As a psychological concept, ‘compliance’ is an important ingredient in attitude models, where the motivation to comply with guidelines etc. plays a decisive role. Satisfaction is a state related to the fulfilment of one’s wishes, expectations, or needs and it reflects the pleasure derived from this. The combination of the two concepts – compliance and satisfaction – results from the assumption that compliance with guidelines etc. that is frequently asked for by society, represented by authorities and other institutions, becomes more probable if those who ask for compliance give something in exchange, or in a more direct way, if compliance provides reward, and, thus, satisfaction. Ausserer & Risser (2007) stated that compliance by addressed groups of citizens, in the sense that they do something that society or its representatives expect from them, will only be achieved if one or some of their relevant needs are satisfied. In everyday language this means that we do things only if they make sense to us. One can discuss lengthily what “making sense” means in this connection, but common sense tells that this refers to the advantages for ourselves that are generated by doing certain wished-for things, either in a material or in an idealistic sense. An advantage in an idealistic sense would also include advantages for others if altruistic motives belong to our repertoire.

Empirical data suggest that walking is seen as something that produces advantages, as for instance reflected by the EU-projects MASTER, SARTRE, HOTEL, SIZE, etc. The question why walking is considered important may be answered with the statement that such consideration reflects either a personal or a social norm. But these norms are obviously not lived up to: as was made well transparent in the EU-project WALCYNG, 50% of all car trips in Europe are shorter than 5km and 15% of all car trips are shorter than 1km.
In connection with the sustainability-related goal to make people walk (more), or continue walking, a short-cut conclusion is that walking preconditions have to make walking more rewarding, or again in everyday language, to make walking make more sense than it does today. This includes at least two lines of action: to make preconditions physically rewarding on the one hand, and to underline, or to remind of, the advantages that walking provides under to-day's conditions on the other hand.

2. Perception of preconditions

As said in the introduction, decisions taken by decision makers that need co-operation by the public will not be accepted by relevant groups in the public, and they certainly will not get their co-operation, without appropriate communication with them (Ausserer & Risser 2007). This refers to what is implemented in practice in order to enhance walking; if society (represented by politicians and decision makers) wants citizens to walk more, then appropriate preconditions have to be provided.

However, what is provided (infrastructure, laws and regulation, campaigns) is subject to individual interpretation (Figure 1), i.e. different people may look at preconditions in a different way. Not only the physical provision of preconditions is of importance, but at the same time how they are perceived. Thus preconditions could be bad and assessed accordingly (including by decision makers etc., with the addition that these groups may consider that it is difficult to improve preconditions, or see no possibilities to do so); preconditions could be good, and assessed as good by road users; but of course they could also be considered as not good enough by the road users. Therefore, and on the other hand, what is provided by the public institutions, or "by society", has to be sold and its added value has to be made transparent, in the sense of marketing; the concept of marketing builds on the assumption that whatever is offered to whatever group has to be adapted to this group, both with respect to the features of what is offered and how one presents/communicates what one offers. Adapting to any group, however, is only possible if one knows the most relevant motives that steer this group; needs, wishes, interests, expectations. It has to be studied thoroughly, what different offers could mean for different groups. If it is perceived that any offer meets one's needs, than the offer might lead to success.

As not only the physical provision of preconditions is of importance, but at the same time how they are perceived, to simply provide preconditions without further comments is not enough. Preconditions have to be provided in the frame of a communication process with the users, taking into consideration what users want and expect, and underlining features one wants to remind of, or give weight to.

One may of course expect a dialectic relationship between expectations and reality, because expectations depend on former experiences. People who walk a lot in practice may have different experiences, and thus different expectations, from people who only walk when absolutely necessary as shown in the EU-project WALCYNG (Hyden et al. 1997). Also, walkers may look at preconditions differently from how decision makers, planners and practitioners do, who probably have a more formal look at things – what has been implemented according to guidelines should suffice. Road users on the other hand may look at implementations according to guidelines somewhat differently, for instance from the point of view of practical usability of things. One example that shows this is from the EU-project ASI (see Figure 2 and www.factum.at/asi). There, in some aspects the assessments of experts differ considerably from how road users see things (Kaufmann & Risser 2007).
### Objective Parameters

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicators</th>
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<tbody>
<tr>
<td>Social</td>
<td>Accessibility to health and social services; Health hazards; accident risk; air quality; travel speed;...</td>
</tr>
<tr>
<td>Environmental</td>
<td>Energy consumption of different traffic modes; noise; smell; average fuel consumption of new car;...</td>
</tr>
<tr>
<td>Economic</td>
<td>Use of resources; Capacity of traffic; fluidity of traffic competitiveness (e.g. car use vs. public transport); cost of accidents;...</td>
</tr>
<tr>
<td>Political</td>
<td>Price policy of the key resource fuel, laws, possibility of participation, tax systems;...</td>
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### Subjective Parameters

<table>
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<tr>
<th>Perception of objective conditions</th>
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<tbody>
<tr>
<td>Security (or subjective safety)</td>
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<td>Perception of the social climate or communication</td>
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<tr>
<td>Comfort</td>
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<tr>
<td>Aesthetics</td>
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<tr>
<td>Perceived costs</td>
</tr>
<tr>
<td>Spontaneous mobility</td>
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<td>Perceived accessibility</td>
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**Figure 1** Facts and perception

**Figure 2** Subjective evaluation before implementation: differences between experts and users in importance ratings of indicators (ASI, Final Report)
What could such discrepancies as displayed in the graph above lead to in practice? At least, one consequence could be that money spent for improving preconditions, so that they “make sense”, is not spent efficiently. To solve this problem, the needs of people who are addressed by certain measures or implementations have to be studied deeply and measures have to be shaped accordingly, in the sense of marketing mentioned above. It has to be studied thoroughly what would make those people one wants to address comply (in commercial marketing to comply would mean to buy a product; Kotler et al. 1999).

In practice it is, however, not a habit or a tradition, yet, that needs and interests of people whom one wants to walk (more), or to keep on walking, are analysed and considered appropriately. The acceptance of measures to enhance walking by different groups is mostly only assumed (if at all taken into consideration). One could summarise this by stating that proper marketing of walking is not carried out.

3. What influences perception of preconditions

Those elements that have impact on citizens’ perception of preconditions are reflected by the diamond model (Figure 3).

According to this Diamond Model proposed by Risser (2004) behaviour-steering effects originate from five areas, and these areas are interrelated. Many issues can be taken up from the perspective of the Diamond Model: to talk about individual dispositions (views, prejudices, habits, etc.) with respect to walking; to talk about the communicative aspects (e.g. how does walking influence communication with other road users); to discuss characteristics of walking and infrastructure (and possibly exigencies in these respects); and to take up societal issues (status aspects, rules and regulations connected with walking). Preconditions in all those areas can potentially have an impact on walking, supportive in the sense that they provide satisfaction; by good communication with others, by social support for walkers, by having at disposal an infrastructure that makes walking pleasant, but also by,
B.5.10. Identification of compliance and satisfaction mechanisms

4. Compliance

As mentioned, compliance means acting in accordance with established guidelines, specifications, legislation, norms etc., or trying to do so. Mechanisms to achieve compliance are based on, or making use of, different types of either reward or punishment. Seen from the perspective of this definition, understanding both the reluctance to walk, or susceptibility for the attractiveness of walking are necessarily connected to the identification of rewarding or punishing conditions.

According to learning theory we talk about reinforcement here, which includes both rewarding and punishing factors. If certain things or conditions increase the probability of a certain behaviour those things or conditions are called rewards, and if they decrease the probability of a certain behaviour they are called punishments. A punishment that is accepted because one has, or wants to, walk in spite of such punishment can also be called a sacrifice.

What is to be considered a reward or a punishment? This is related both to individual (attitude, personality, etc.) but also to social preconditions (expectations, norms), etc. From this perspective, regarding attractiveness of walking, it is obvious that one has to identify factors connected to walking, or to the option of walking, that are rewarding or punishing according to the affected persons' view first. Only such knowledge allows one to assess the probability of compliance with the sustainability-related goal to walk (more), and to implement measures, accordingly.

5. Satisfaction

Satisfaction is a state 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 et vice versa (see also further above). Studies that deal with the issue of customer satisfaction, like market analyses, patient satisfaction surveys, etc., all underline that:

- products or services have to meet the addressed persons' (in market research called customers) expectations in order to provide satisfaction
- communication about any product or service can help to highlight relevant features of any service or product and has therefore the potential to enhance the addressed persons' satisfaction
- expectations, what is seen as a reward or as a punishment (sacrifice) in relation to these expectations, and the weight of both rewards and sacrifices when compared to each others influence an addressed person's satisfaction.
With respect to any wished-for behaviour, one could formalise this last point as follows:

\[ A_{wb} > A_{nb} \] (meaning reward > sacrifice)

\[ A = \text{attractiveness}, \quad wb = \text{wished-for behaviour}, \quad nb = \text{non-desired behaviour} \]

The sum of all that is perceived as a reward has to exceed the sum of all that is perceived as a punishment (disadvantage, etc.).

In the EU project CAST (Delhomme et al. 2009) this in-equation has been displayed in the following way (see Figure 4 below).

![Figure 4](image)

**Figure 4** The scale of perceived benefits and costs exemplified by car use behaviour

The consequences of the balance between rewarding and punishing elements derived from a certain type of mode use are different depending on whether one has a choice or not (for instance, if one has no possibility to use a car):

**Consequences for persons who have a choice concerning the mode they use**

If the rewards connected to walking by members of this group are perceived as being too small and/or sacrifices as being too large, then they will avoid walking. I.e., they will show no compliance with the sustainability-related goal to walk (more).
Conclusion for captive pedestrians
If punishing elements connected to walking exceed the rewarding ones, then persons who are forced to cover a larger portion of their mobility by walking, viz. those persons who (often) have no choice than to walk, suffer\(^1\). To this group of persons belong:

- senior citizens (the older people get, the more they have to rely on walking)
- functionally impaired
- poor persons (no car, no driver's licence)
- children, youngsters

Thus, whether walking preconditions are perceived as satisfying or not, influences mode choice for those who can choose. For the others it influences well-being\(^2\) in a detrimental way, arguably producing costs for the health system.

6. How to enhance compliance

![Diagram of the adaptation of products, ideas and suggestions for citizens/road users (the "customers")](image)

**Figure 5 How to enhance compliance via the improvement of satisfaction**

\(^1\) Everybody has to walk every now and then, e.g. to reach the parked car, but it is common sense that tells us that distances that car drivers have to cover by walking are shorter than those of users of other modes (maybe with the exception of people who mainly use the bicycle)

\(^2\) This does not necessarily mean that well-being is provided by this choice; frequently people who drive a car regularly say that they would like to use another mode of transport but that the options for alternatives are so unsatisfying (see Hyden et al. 1997 WALCYNG)
According to the way of thinking reflected so far and summarised in Figure 5 the providers of walking preconditions or anybody who wants to promote walking have to learn about the customers’ views (motives, needs, interests, attitudes, habits etc.) in the first place. Depending on this, physical and structural preconditions for walking have to be designed, in order to meet pedestrian quality needs. However, the provisions for walking also have to be "explained", so that misunderstandings that often also hide prejudices are avoided. Not least, persons who do not walk frequently or do not like to walk tend to see and to assess preconditions (infrastructure, time consumption and length of ways, opportunities to combine walking to other activities, etc.) erroneously; i.e. they do not know facts or they reproduce a blurred perception of facts when asked. The necessary information has to be provided in order to make facts known as well and as appropriately as possible (Hyden et al. 1997).

Regarding mechanisms for achieving compliance an article was published by de Lange and Joireman (2007) underlining to some degree what has been said so far. It relates to the likelihood of prosocial behaviour. This is relevant in our case, because from a certain perspective (environment, global warming, sustainable cities, etc.) walking instead of using a car on short trips can be seen as prosocial behaviour. The chance of such behaviour definitely increases when people understand the advantages for themselves inherent to such behaviour. Therefore, when communicating with walkers, but also with persons who do not walk (but should do so if one thinks of approximately 15% of all car trips are shorter than 1km) according to de Lange and Joireman, one should discuss the following issues:

- the individual's needs and interests (are they met well when one walks?)
- equality issues (is equality provided when compared to other modes?)
- co-operation (is co-operation provided by the authorities, by the social environment, etc.?)
- competition (with whom does one have to compete when walking, how good are the chances to persist?)
- altruism (what is the paradox in altruism, meaning what advantages does it bring to oneself?)

It can be seen clearly that many of these issues – for instance “advantages of altruism” - can only be dealt with in the frame of communication and cannot be tackled with the help of physical measures.

7. Compliance with the goal to enhance walking by official persons

Let us now talk about the compliance of, e.g., politicians and decision makers with the goal which they themselves underline frequently: *To strive for a sustainable society, including the promotion of walking*. What reward do they receive for supporting walking? As there are no strong groups representing walkers that with heavy weight could provide good publicity for politicians who support walking, there is no direct reward on first sight. But good preconditions for walking seem to be connected to good Quality of Life, as for instance the results of the EU-project HOTEL indicate (Bein et al. 2004, www.factum.at/hotel). That means that if decision makers improve preconditions for walking in an appropriate way they would improve Quality of Life, which of course can be “sold” to voters and produce rewards. However, the risks of supporting walking are considerable, as well: improvements for walking – e.g., more space for pedestrians, shorter walking times and longer crossing times for pedestrians, measures to ensure lower car speeds – have the potential to be experienced as disadvantages by car drivers. At least institutions and organisations which see themselves as representatives of car drivers express such a view of things. This reflects a conflict between two different groups of road users, where those who speak in the favour of car drivers – car
driver associations, car industry, etc. – have a higher potential to exert pressure than representatives of pedestrians. This is in accordance with the theory of Flyvbjerg (1998) who claims that decisions in society are taken on basis of the distribution of power and not – as one arguably might wish – on basis of rationality.

At the same time, it does not seem that society as a whole protests if no radical improvements for walking are implemented. On a case basis one experiences that people complain about narrow board walks, barriers on walking paths, bad maintenance, bad organisation at intersections to the advantage of car drivers, etc. (Risser 2002, Fischer et al. 2004, Ausserer et al. 2009). But the impression is that the public still more strongly asks for good preconditions for using the car. It is obviously easier for politicians and decision makers to act to the advantage of car drivers than to do the contrary.

It looks as if to implement improvements for walkers would depend on intrinsic motivation of politicians and decision makers rather than on achieving short-term support by the public – they do so in order to protect values they believe in and expect advantages in the long run. This can also be called idealistic behaviour (to "do the right thing"). Thereby they have the chance to act as an avant-garde; by consistent acting – i.e. by acting in accordance with what they say – and thus could convince the population that the issue is serious and worth some effort.

At the same time they also could receive extrinsic reward for the support of walking as sustainable transport mode, because sustainability is supported by many people. Europe wide surveys carried out in the frame of SARTRE ("Social Attitudes to Road Traffic Risk in Europe") in 1991 showed that car drivers do not only accept but even support – at least in words – measures that enhance walking, and the EU project HOTEL some 15 years later produced similar results.

8. What can be done?

To end this chapter it should be shortly discussed what everybody should do to give walking more weight. To walk more is of course a request that concerns everybody. However, it is not probable that everybody reads this book and is convinced what is written in it. Systematic measures are needed in order to achieve the goal to make people walk. To consider quality needs is one important element on the part of the measures, not a measure in itself but a decisive precondition for developing and implementing measures that are effective and efficient (remember: measures that suit those who cannot choose and that convince those who can choose to walk instead of using the car on shorter distances).

What types of measures can be envisaged? When following the diamond model (Figure 3), one could start with

- **Measures on the individual side:**
  Information campaigns that address the issue of walking belong to this area. But also long term measures like including walking issues in traffic education programs could be recommended. And not least, walking should be a topic dealt with in the driving school. Practically everybody is a walker but what is necessary in order to make walking comfortable seems to have been forgotten, especially when it comes to how car drivers behave on the road; inappropriate vehicle speeds and neglecting pedestrians’ right of way, or more generally ruthless car driver behaviour, among other things, influence walkers well-being decisively. In this connection, also law enforcement activities may be counted as measures that have the potential to educate the individual.
• **Measures in connection with communication among road users:**
  As indicated above, the right of way of pedestrians should be protected. One important issue in this connection is to eliminate or reduce the feeling of being the weaker partner in the frame of communication with all other types of road users, the one who regularly loses when there are conflicts of interest with other groups, which is most often the case at intersections. Law enforcement, as mentioned above, but also infrastructure measures that reduce vehicle speeds, or that bring road users who have to communicate with each others better in each others vision fields. Though, when focusing on the latter issue, it has to be seen to it that “seeing each others better”, does not automatically mean that the pedestrian has to stop because he/she is the weaker one, or that bringing pedestrians better into the vision field of car drivers is achieved with the help of barriers for pedestrians, blocking their way and forcing them to walk longer distances. Communication between bicyclists and pedestrians can probably be improved by not putting the two groups together on narrow lanes and spaces.

• **Societal/structural measures:**
  On a societal or structural level activities and measures can be separated into official or formal ones, or informal ones; the former are legislative and law enforcement measures, and all types of measures to shape the public space; the latter ones that are more difficult to control and/or to steer refer to what is written in newspapers and stated in the electronic media, what is said and discussed in the family, by friends, in the pub, etc. How seriously an issue is taken by the official representatives of a society is reflected by measures taken by the public institutions with respect to the design of the public space, to the laws that are introduced, to law enforcement, to the public discussion as far as official persons are involved in it, and also to what degree science and research are made use of and listened to. E.g., do politicians know, or ignore the fact that in the industrial countries only about 50 % of the total population have the possibility to drive a motor vehicle. Do they therefore enhance measures to support those who of course have to walk more.

• **Infrastructure measures:**
  An infrastructure that is easy, comfortable and safe to use belongs to this area; appropriate height of curbs, slopes at curbs, smoothness of surfaces; distances to walk at cross roads, crossing times provided and waiting times produced by traffic lights; measures that cost much energy or cannot be used (easily) by persons with functional limitations (like pedestrian bridges) or that cause feelings of not being secure (like tunnels); public lighting by night; measures that control vehicle behaviour where they interact with walkers (narrow lanes, humps or elevated intersections, small roundabouts, etc.). As said above, what the infrastructure looks like reflects how seriously pedestrian issues are taken by the responsible.

• **Vehicle or mode related measures:**
  Pedestrians are of course no vehicles, but walking is a mode of transport the characteristics of which have to be protected when providing preconditions for walking. Walkers are slow, approximately 5 km/h, but some of them are much slower (e.g. very old persons), which has to be considered at intersections. They rely on their own energy and have limited power and there is also a very strong variation of stamina in different walkers. This means that staircases, long walks, high curbs, rough and irregular surfaces, etc. are difficult to tackle for some, and not welcome by many. They are not protected by any coachwork and therefore more vulnerable than car drivers, and in case of collisions with car drivers they are utterly endangered of being seriously injured or killed. In the case of walkers, to consider mode characteristics is in many respects connected to providing appropriate infrastructure, as can be seen.

This list of different measures that can be taken in order to improve preconditions for walking and to bring them nearer to the pedestrian quality needs refers mainly to “official persons”,
i.e. to those persons who have official responsibility for traffic and transport due to their function, or profession in society. They have duties, in this respect. For others, including researchers, it is a matter of interest whether they invest energy in order to make walking more visible or to enhance the development of better preconditions in connection with their work and/or their lifestyle. They have to be addressed by the “official persons” inappropriately, through all these measures, and certainly a lot of other measures that have not been mentioned here.

9. Conclusion

Compliance means acting in accordance with established guidelines, specifications, legislation, norms etc., or trying to do so. Mechanisms to achieve compliance are based on, or making use of, different types of either reward or punishment. Satisfaction is a state 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. To enhance compliance by different groups more has to be known about these groups (in case of pedestrians and “potential” pedestrians). Furthermore physical and structural preconditions for walking have to be designed in such a way that they meet pedestrians' quality needs. Thus, pedestrians would perceive them in as being rewarding.

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Identification of promising interventions

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‘Knowing is not sufficient, one has to apply too; willing is not enough, one has to act too.’  
J. W. Goethe

Summary

This essay deals with the process followed to determine promising interventions. It outlines methods and tools useful to people with different professional expertise who, in their different roles and positions, in the public administration or as consultants, are involved in the improvement of pedestrians’ walking and sojourning conditions in the outdoor public urban spaces.

The determination of the actions to take can start only by the awareness of the presence of specific real problems and of their urgency to be solved. The first part of the essay deals then with possible methods to find out actual problems, of various order, and to prioritise them. It explains then how it is possible to devise solutions apt to face such problems, how the solutions can be evaluated for defining their consistency and appropriateness, and thence their success, both from the scientific and community viewpoint. Finally it describes briefly possible alternative solutions, organized in measures. They constitute different options among which to choose and concern various aspects of the analysed system: the pedestrians themselves, the social environment, the transport network and the physical environment in which pedestrians travel and sojourn. The propositions are above all at tactical and operational level, but the application of some measures could, in time, influence some choice at strategic level, for example the choice of transport mode, i.e. walking.

1. Introduction

Before starting to deal with the identification of “promising interventions”, it is timely to clarify how such wording is intended. The word “intervention” comes from the verb “to intervene”, which means to take part in an occurrence by a specific action. Then it is important to specify when it is necessary to act.

In previous sections pedestrians’ needs and expectations, as well as the features of the current situation, have been defined. The former, that are translated into requirements, constitute the pedestrians’ “demand”, strictly related to the many facets of this user category, the latter, that are translated into performances, constitute the environment “supply”, strictly related to the peculiar characteristics and propositions of the spaces in which pedestrians...
move and sojourn, as well as to the social aspects that can act as barrier or as supporter of pedestrian mobility. For having a congruent environment, that is a sustainable environment satisfying the pedestrians’ wishes, the pedestrians’ demand has to be met by the environment supply. When the demand is not met, or is not completely satisfied, or the supply is unsuitable, or misused, then it is necessary to take action for bringing back the system to an equilibrium; it is the time to decide which are the interventions, both technical and non, that meet the identified needs, on their whole.

It is appropriate now to define the word “promising”. This word was used some years ago as acronym of a European funded research that was aimed at defining measures that would improve safety for vulnerable road users, among which also pedestrians. In particular these measures were to achieve greater safety without reducing mobility freedom; i.e. they were not to be restrictive or conditioning for pedestrians, even though effective and cost beneficial. Such concept can be broadened to all the interventions aimed at improving the various performances offered by the urban environment, not only safety, and to a higher number of attributes, which qualify the interventions and help to select them, having in mind the pedestrians’ needs/requirements as first sieve. Afterwards, other research works focused indeed on the factors that can make interventions promising for pedestrians.

In this essay it will be tried to offer some suggestions for defining an intervention as promising for pedestrians and, possibly, not only for them. A starting point could lie in the fact that interventions are proposed, and their suitableness is assessed, by the users themselves. Therefore users’ participation to the various steps of the decision process plays a central role. Such participation can be different depending on the level, direct or almost direct at local level, indirect, through representatives, at regional or national level.

Some suggestions will be given, at the various steps of the decision and planning process, on how to determine prior areas of intervention, more appropriate fields of action, and more agreeable measures, depending on the various unmet requirements, on the deficits that are perceived as problems to solve, due to physical or social shortcomings.

The interventions under discussion can pertain to different levels: macro, meso and micro level or political, strategic, tactical and operational level. They, considering specific actions that should answer to various dissatisfactions, can be called also solutions; these can be further broken, from a general level to alternative measures, very concrete devices, down to details, among which to choose at the design and implementation stage. This hierarchy system can be very interdependent as each element of it can be very intertwined with other solutions or measures.

In this chapter, the process followed to identify promising interventions, that is described in the first two parts, and the outline of solutions and measures, in the third part, are dealt with as an integrated sub-system and paying greater attention to the urban design level.

2. Premise

Dealing with this issue, the first key question that comes to mind is: How can promising interventions be identified? The answer to this question asks for developing a process, organized in various steps. Some of these steps have been faced also in preceding chapters;

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2 PROMISING - Promotion of Measures for Vulnerable Road Users (1997-1998), is a research funded by European Commission/DG7 in the IV Framework Programme for Research and Technological Development, in the Transport Program, co-ordinated by SWOV (Institute for Road Safety Research, NDL) and carried out by experts of universities and research bodies of 10 European Countries.
in the first part of this essay they are only briefly treated, reporting methodologies, experiences and results of European funded research previously carried out on sustainable and pedestrian mobility, for the sake of maintaining the process character.

2.1. Interventions for solving problems

If we go back to the reason why we make interventions, we can say that we take action because we need to adjust the existing situation, to solve the problems that pedestrians encounter when moving and sojourning; problems that are caused by the urban environment not designed at their size. The analysis of the existing situation is the first input to be considered both to spot the inappropriate features to tackle with and the “qualities” to keep in mind; the former represent the problems to be solved the latter give suggestions on solutions, which are or could be usable.

Many are the methods to use for finding out the most important needs/wishes/expectations that are not met, and that thence become problems to be solved, as well as for finding out the most appropriate and agreeable interventions to face them.

A procedure articulated in many steps and using a qualitative approach can be followed to examine the actual situation and to detect opinions both of the multifaceted class of users, as “connoisseurs” of their own situation, and of experts, with different disciplinary backgrounds and roles, as responsible of research works and theories or of choices and implementations for re-shaping the urban environment. The results highlight which are the conditions that users think good or bad for their mobility: complaints and wishes, on the one hand, solutions, on the other hand. The use of the same type of enquiry also for experts enables a technical check, in particular, of the solutions.

This is the approach that was chosen, for example, in the European funded research SIZE. Besides an initial review of literature, such research carried on international workshops, for confronting the perspectives of senior associations and experts, focus-group interviews, involving separately seniors and experts, face to face interviews with experts, and a questionnaire to be administered by phone to seniors and experts in eight European Countries.

Considering that seniors, together with children and people with reduced mobility, represent the most vulnerable categories and that these have many problems in common, and remembering that shaping the street environment for the most vulnerable users means to improve it also for the other categories of users, we could take the problems that have been detected in SIZE, as it concerns pedestrian mobility, and use them as a checklist to start with.

It is also possible to apply different methodologies, at the same time, for understanding which are the actual barriers and problems pedestrians encounter in performing their activities in the urban environment. For example in the European funded research PROMPT various methods and tools, from rigorous scientific criteria to subjective assessments, have been defined, and validated by their application in selected case studies. The different approaches have been chosen depending on the various aspects of the urban environment to analyse: accessibility and safety, comfort and attractiveness, offer of intermodality and possibilities of implementation. Users’ and experts’ opinions have been considered and confronted to put

into evidence reality as experienced and convictions, true and false problems, expectations and wishes (Rauhala, 2007).

In particular, in two work packages, methods that analysed at the same time subjective and objective aspects, and confronted the results, were used for assessing the mobility conditions and finding out the main problems. In the first case, a questionnaire, used for interviewing on the spot people moving in the case study area, provided subjective opinions that were confronted with the objective survey made by the researchers; in the second case, opinions collected with focus groups and interactive workshops were confronted with the survey and the analyses made by the researchers.

In the research ASI, such approach was finished and fully applied for the assessment of the mobility conditions in relation to life quality, outlining an indirect method based on the contextual analysis of subjective and objective aspects. The reason of such choice is related to the conviction that the first evaluation should be based on the investigation of the perception that users have of the surrounding environment, where they move and sojourn, because this is what people see and care for, and that, eventually, needs to be improved. Planners and technicians though can mainly act on objective aspects for improving the environment in which people live. The actual objective situation can therefore be regarded as the handle to be used for influencing users’ perception. Then, for analysing and assessing both aspects, qualitative and quantitative research methods have been used. The comparison between perceived reality and objective reality can help to understand which aspects of the environment need to be modified so that people may improve their opinions about it (Steg et al., 2007).

2.2. Priority of intervention based on deficits

When interventions are planned, it is important to start from those solving the problems that users regard as the most important ones; in this way people will think the interventions that are carried out as timely. It is therefore important to decide which are the shortcomings to face first, as consequence it is possible to choose indirectly which interventions to make first. Ranking is a useful tool because enquiries usually result in lists with a great number of problems, too many and too punctual to be handled singularly since the beginning of the process; they can be integrated and hierarchized, so to form classes of problems, that are interrelated among themselves.

The importance of the problems can be weighed using various parameters. For example, in PROMPT, partners individually evaluated classes of problems, on the basis of the “urgency” to solve them, using a Likert type scale; such evaluations were then weighed using various techniques. The result consists in a list that points out the most urgent classes of problems to solve at international level. This list too could be considered as a reference.

Ranking lists, grounded on evaluations expressed in questionnaires by users’ samples, can be also elaborated; on the basis of the “frequency” of the detected problems it is possible to identify the ones that have to be solved first. In SIZE, the older people’s sample, using this

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method, pointed out quite a number of problems, of these an overwhelming majority was connected to pedestrian mobility. For the same reasons expressed before, such ranking list could be then taken as a starting point.

A variant of this method considers that the evaluation, that users make of the various aspects of the actual situation, is expressed, in questionnaires, by two parameters: satisfaction and importance, that are rated on the basis of a Likert type scale. For reading at once the questionnaire results, the methodology already experienced in PROMPT and ASI (Martincigh, 2009) can be adopted. Such results, after having been elaborated as mean values, are represented in a Cartesian plane, taking into consideration the two different variables at the same time: satisfaction level and importance level. The positioning of each parameter in the four quadrants helps to understand, at a first glance, in which ambit it is more important to act and which are the priorities of action. In particular, the aspects that are located in the quadrant where satisfaction is low and importance is high are the ones to be addressed first. This reading enables to concentrate the resources at disposal, if necessary, for addressing only the issues that are the most urgent and relevant for the users and the experts, involved in the design and realization of that specific project. Then, only in the second instance, the aspects that are unsatisfying but not so important for the users will be faced.

The Cartesian plane can be read also for the positive aspects: the qualities to be safeguarded and enhanced. The features of the urban environment, both physical and social, that are located in the quadrant where satisfaction and importance are high can indeed be read as possible promising solutions.

2.3. Priority of intervention based on requirements

Applying a user oriented approach, it has to be noted that, since the satisfaction index is given by the requirements/performances meeting, problems can be linked to the lack of some performance class, as listed in the UNI national norms or as newly devised for the outdoor specific situation: accessibility, safety, security, comfort, use, appearance, management, integration, environment safeguard (Martincigh, 2002). Problems can then be grouped in clusters that identify negative circumstances strictly connected to one of the requirement classes. Each cluster foreshadows a potential area of intervention; the solutions to apply will offer performances consistent above all with the main requirement class of each cluster. The clusters have to be rated for understanding on which requirement class is more urgent to act and which are the most important solutions, affecting the physical or social environment, to apply. Different methods can be used to make such ranking: an experts’ evaluation, based on literature; a synthetic index, constructed considering various parameters, and so on.

The rating made in the research SIZE shows that the problems in need to be solved first concern the requirement class of “Safety and Security”; “Sociability” follows, while “Comfort” and “Accessibility” seem to have less importance. It is worthwhile to underline that the issue of appearance, which did not emerge by the enquiry carried on in SIZE, is considered as a significant aspect for pedestrians’ urban quality, and then should be always considered.

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7 Please see first citation of Note 3.

In the research PROMPT the aspects that were analysed, in part coincident with the requirement classes: Safety, Accessibility, Comfort, Attractiveness, Offer of intermodality and Possibilities of implementing the devised measures, have not been rated, but the order in which they are considered is in some way leading.

2.4. A two faced tool: the indicators

In the decision making process, it is possible to bypass the procedures described before by applying the appropriate indicators. These tools are very useful since they translate a complex knowledge into simple terms; they have to be therefore constructed and need to be updated. Indicators, with characteristics and objectives specific to the topic at hand, are built on the experience gained in quantity and quality enquiries of the type mentioned before. Such indicators can be used to evaluate the existing walking environment, and thence also to spot much more easily, by different types of measuring and by the application of thresholds, the presence of problems.

Being the indicators a two-faced tool, both of state and of transformation, they give at the same time also suggestions for policy and strategies to apply and can be used as guidelines by planners and designers, for deciding the type of interventions to make, when and where the pedestrians’ requirements are not met. These are though indications on solutions to the problems, but not real measures. In short, indicators represent an intermediate device, since they can be used both as check tools of the existing situation and as proposing tools. In the latter capacity, they lead the choice of the technical and non-technical interventions to realize, indirectly prioritise them and, finally, foreshadow general solutions that can then be supplied with implementation measures, among which to choose, in the design phase, the ones most appropriate to the local situations.

3. Resolving interventions

The second key question that comes to mind concerns the devising and choice of the solutions to apply. As before, for finding an answer it is necessary to face a procedure in various steps: collection and devising, evaluation and structuring of the solutions. Also in this case these three steps are described reporting methodologies applied and results achieved in European funded research projects previously carried out on sustainable and pedestrian mobility.

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9 Specific operational indicators, that could be useful to this aim, have been described (characteristics, direct and indirect goals, eventual transversal relations, indications for calculation and for representation, thresholds values, data sources) in: “The mobility factor in the reconversion of dismissed areas”, theme deepened by the research group of the University of Roma Tre, Rome (I), responsible: L. Martincigh, Department of Design and architectural studies, part of the National research project (PRIN, 2004/06): “The environmental compatibility in the rehabilitation and reconversion project of disused areas”, national coordinator: M.I. Amirante, Department of Restoration and Building of Architecture and Environment, Second University of Naples (I). Also some of the indicators, as well expounded, included in the enquiry fields in which a toolbox for design assessment is organized, could be referred to (Martincigh, 2009). Such toolbox was devised and tested in a pilot study carried out within the research project: ASI – Assess implementations in the frame of the Cities of Tomorrow, co-ordinator R. Risser, FACTUM (A). [http://www.factum.at/asi](http://www.factum.at/asi) (Last updated 29 Feb. 2004).

10 See also PQN Final Report Part B1.15. The walking environment design: indicators and measures.
3.1. Collection and devising of solutions

It is worth to remember that the resolving interventions to look for concern the improvement of the overall quality of the urban environment in which pedestrians move, therefore they will act on the physical, social and transport environment, considering their mutual interrelations.

Since this report addresses a European audience, such solutions should be alternative and equivalent, so to be tailored, time-by-time, on the specific case. Moreover they should be holistic, that is they should solve the highest number of detected problems at the same time. Finally, they should satisfy the users' requirements, very often conflicting, in such a way as to offer a relative optimum or a differential benefit.

Solutions can be deduced by a specialised literature search or can be proposed on the basis of expertise, in in-depth interviews, focus groups or workshops, according to key questions, or finally can be devised by researchers, but not only. Possible cues for solutions to the detected problems can indeed be proposed also by users, if involved in well organized, facilitated meetings.

The European research PROMPT applied some of these techniques. For example, a new model of workshop, stemming from the "European Awareness Scenario Workshop", a tool promoted by the E.C. and experimented in various Countries, was defined and tested, with the aim to let users participate in the decision process in a constructive and not demagogic way. This form of meeting, for the involvement of representatives of various age and gender groups and for its structure, caused the dwellers to confront, with the help of facilitators (psychologists and architects), their different ideas so to express concerted opinions both at assessment and at proposal level, pointing out main problems and qualities, and finally suggesting changes to make and ideas for solutions to the detected problems. It has to be underlined that the most innovative and imaginative proposals have come from the children.

In PROMPT, an interesting method for what concerns the devising of solutions by experts was also experimented. A brainstorming meeting was carried out, with the aim to let emerge first ideas for solutions to unsolved, or not properly solved, problems. For helping all the partners to feel in the most relaxed way and to let ideas for solutions flow freely, the brainstorming was guided by a specialist, in the capacity of “facilitator”. The brainstorming was organized in several sessions; solutions were devised, proposed, voted, chosen, deepened for understanding better their meaning and their purport; at the end of the exercise a long list of more or less pertinent, interesting solutions resulted. Since in the research program the involvement of the end users groups was very important, in order to facilitate the “contagion” effect, a half day brainstorming meeting was organized to collect users' opinions, not only for finding out negative aspects, but also for proposing solutions they agreed with.

3.2. Evaluation of solutions

Methods for evaluating solutions can be of various types, depending also on the involvement of different actors.

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11 Information on this tool can be found in some booklets: de Luzenberger, G., a cura di, “European Awareness Scenario Workshop”, Ministero dell’Ambiente - CUEN, Napoli, I, 1999; Amodio, L., a cura di, “Atelier del futuro”, CUEN, Napoli, I, 1999, on http://www.cordis.europa.eu and on various web sites where some of its applications are reported.


13 Please see Note 4.
Users can evaluate solutions indirectly, expressing their satisfaction for, and attributing more or less importance to, specific features of the mobility environment, as in the case of the research ASI already mentioned. They can also express their opinion directly, by way of a questionnaire in which some suggested solutions are listed and ranked, for example on the basis of the major or minor “urgency” of the intervention, as in the case of the research SIZE, where also experts expressed in this way their opinions.  

Experts can also make a more in depth evaluation, for example according to some parameters: *importance*, i.e. how important are the problems addressed by the solution; *pertinence* i.e. how well are these problems solved by the solution; *novelty* i.e. which are the innovative aspects of the solution; *feasibility* i.e. how easily the solution can be implemented and so on. This method was applied in the research PROMPT, where the solutions proposed by the partners at the brainstorming, for solving each class of detected problems, were successively evaluated by the partners with the aim to identify the most suitable ones.

Experts can judge the measures, connected to the solutions, even more precisely, giving a subjective evaluation based on their knowledge. The evaluation method can refer to analytical methodologies, based on expertise, already used in various European research works (PROMISING, WALCYING, PROMPT, SIZE). Measures can be assessed assigning a synthetic level of evaluation, on the basis of some parameters: for their being holistic and suitable, feasible, effective and efficient regarding the target, non restrictive and durable (sensitiveness for maintenance, management and need for updating); finally, for their being appropriate to the specific country situation, for relevance of the problem, for urban structure and social and cultural environment. This makes possible to elaborate priority rankings and thence to build a hierarchy of measures to refer to for facing the unsolved problems.

Obviously the first step is to interrelate the devised solutions (ideas for interventions) to the detected problems (un-met expectations and barriers). For proposing solutions that are appropriate to negotiate the detected problems, it is very important to verify the correspondence between the more or less frequent problems and the more or less urgent solutions. The main criterion for the selection should be the “relevance”; the screening therefore should take into account first of all the most urgent solutions/Measures that solve the most recurrent/important problems.

3.3. Structuring the solutions

Also the solutions, depending on the method used to collect them, can result to be in a large number and of different scale or level. Each solution can be implemented through one or more measures apt to solve the detected problems. Different approaches can be used to organize them.

For example, solutions could be grouped into fields that foreshadow different qualitative characteristics of the urban environment, all strictly interrelated; such fields constitute the set of main performances that the urban environment should offer to be at “pedestrians’ size”.

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14 Please see Note 5.
15 Please see Note 4.
16 The scope of the EC project WALCYNG (Hydén et al, 1998) was enhancing “walcyng” instead of short car trips (“walcyng” meaning walking and cycling). The WALCYNG Quality Scheme (WQS) was suggested as an instrument to check the walcyng conditions in a certain area of interest (a target group, a type of product, a route or a neighbourhood etc.). The questions in the WALCYNG Quality Scheme are grouped for different themes; for example for safety the questions assess the current situation, the importance and the feasibility of implementing one safety measure.
17 Please see Note 2.
B.5.11. Identification of promising interventions

Fields to be considered could be: An accessible environment, A safe environment, A secure environment, A comfortable environment, An appealing environment, A salubrious environment, A lively environment, A busy environment and so on. This clustering let the stakeholders target the intervention to the requirement classes to be faced first (Section 2.3.); the specific situation and shortcomings can indeed be addressed by choosing the most appropriate field/s of solutions, and the connected measures inserted in it.

Another method could be to group solutions in “Families of Solutions”, interrelated and integrable, that foreshadow different scenarios, in which specific steps of the process are faced, from the political and strategic choice (what to do), to the design idea and the implementation of the measures (how to do it). In each family is outlined a hierarchy of solutions, in which the former acts as “father” and represents the issue that has to be developed, while the latter prefigures the “members” of the “family”, to be organized following their degree of relationship, and represents possible ways of developing the issue, with technical and non-technical measures.

In this case the proposed solutions are selected and organized on the basis of their problem solving potentiality. In this way each class of problems can be worked out by one or more “Families of Solutions”, adoptable depending on the detected shortcomings and on the particular places, singularly, in common or integrated with other Families, proposed to solve other classes of problems. This approach was used in the research PROMPT; in the following pages these “Families of Solutions” will be described.

Proposed solutions, and connected measures, can also be classified on the basis of various domains; such classification helps to indicate different fields of interest and expertise that foreshadow prior fields of action. For example in the research SIZE, synthesizing the organization already made in PROMPT, six fields have been defined: the “policies/laws/norms field”, that contains the solutions concerning strategies and laws as well as technical norms acting both on people and on the environment and transport systems; the “social/campaigning/educational/training” field that contains, on the one hand, all the solutions concerning public opinion awakening and advertising campaigns of various type and, on the other hand, all the activities and courses concerning education and training; the “control and enforcement” field, that concerns both the direct and indirect approach aimed at inducing changes in behaviour; the “infrastructure”, “transport” and “sign systems” fields, that include solutions concerning both the planning or organization and the design at different scales, up to the single object, thence from urban design to industrial design.

It seems advisable to say that the best strategy, to obtain the maximum result, is to integrate various fields of action. The outcome of this classification of the analysed solutions, in SIZE, was a diagram that could be read, starting from the highest value, also as a strategy to follow: measures implemented in the infrastructure field are of main importance but policies, laws and norms, even if at a quite lower level, have to be assured for guaranteeing the correct implementation. Control and enforcement activities have to be matched to campaigning and other social and educational activities, and training, if failure has to be avoided. The weight of the measures in the transport field is less and the field related to the sign systems is the last of the group.

Please see note 4.

Please see note 4.

In PROMPT, it had been proposed a classification for solutions based on three checklists answering the questions: Where the solutions can be implemented? How can they be implemented? Who are the actors involved? The “check list” gave an idea of all the domains the solutions could be referred to and constituted a framework to place the devised solutions in. Such great classes could be interrelated and their relations could be studied by matrixes; each solution could be inserted in more than one class (Please see note 4.).

Please see Note 2.
It could be useful also to order the proposed solutions and measures, technical and non-technical, per use: some are of common or uncommon use; others are pilot project or just proposal. A similar classification could also be expressed in another way: some are representative of the international best practice; others are improvement of the current measures, that are not congruous with the expressed requirements or consistent with the characteristic of the urban environment; finally, others are ideas, that need further study and validation before being considered innovative proposals.

Finally it is very important to consider that measures can be at prompt and at deferred effect, can be of impositive or of inductive type. To classify them also in this way enables to make some considerations that are useful for choosing among them, when they are equivalent and alternative. The best solution is to integrate the two effects.

4. Overview of promising interventions

The interventions that are proposed here are all aimed at making the city be, and clearly convey to be, tailored also on pedestrians’ needs and expectations, for enabling them to enjoy in walking and sojourning in the urban spaces. The achievement of such goal asks indeed for a commitment in policy, for taking up walking friendly strategies, and in practice, for a change of point of view.

To this aim, the importance of taking actions in various fields and directions is evident: urban and transport planning must go along with a skilled design of the public spaces and the choice of congruent measures; with people consultation and involvement, by the right participation techniques, for making the pedestrian realm appropriate for all the user categories; with dissemination and promotional campaign, aimed at creating a more rooted walking culture and, last but not least, with strategies for converging or raising funds.

The proposed solutions then span the political and strategic level, the design idea and the measure implementation, and are technical and non-technical. They have been collected and devised in two European research projects: “PROMPT-New means to PROmote Pedestrian traffic in cities” and “SIZE-Life Quality of senior Citizens in relation to Mobility Conditions”. Therefore some are representative of the international best practice, others are improvement of measures that are used normally but are not congruous with the expressed requirements or consistent with the characteristic of the urban environment, finally, others are innovative proposals of various types.

4.1. PROMPT Families of Solutions

The systematic approach used in the research PROMPT for devising the Families of Solutions, (already mentioned at Section 3.3.), highlights the multiplicity of actions that can be taken to achieve the scope as well as the complementarity and synergy among them. Each Family of Solutions is apt to solve, in a holistic way, some lacks, therefore it can be adopted and, inside it, solving tools of different level can be chosen, depending on the detected problems. Each scenario makes indeed alternative suggestions that can be tailored, time-by-time, on the specific case, respecting eventual peculiarity of each country; this method allows solving the dilemma between the global and local approach.

The 12 families are briefly described below, mentioning only some of the most important solutions and measures, and describing a little the ones that are more innovative. They are listed not following the order they had in PROMPT, related to the ranking of problems and solutions, but trying to present first the ones more characterized by higher activity levels. This
cannot be though a strict order since, as already explained, every scenario concerns, and integrates, various levels of action to solve a problem. 21

**FoS 1: Each Municipality should have a pedestrian policy**

The municipal level is undoubtedly the pertinent level for policies and implementations in favour of pedestrians. Local interventions though could remain just talks or pilot-projects if they aren't supported by higher-level policies (international, national or regional levels). It turns out right then the famous assertion “Think globally, act (walk) locally” (Tab. 1).

**Basic involvements**

To start, and maintain, walking friendly policies, it is of main importance to provide political and technical, legal and financial support. In particular, since changing the current mobility patterns is generally considered unpopular, the co-operation between different institutional levels, the employment of different term visions on sustainable transport and the involvement of the citizens in the decision making process have to be encouraged. Social consensus is indeed necessary and it can be reached using also particularly sensitive arguments such as social equity, revitalisation of communities, health and fitness.

**Means of various types**

The best support for getting under way a walking friendly policy is to make successful implementations. To this aim it is important: to provide adequate means (human, financial, technical); to identify the right correspondence between goals and means; to make a credible implementation plan, defining not too long deadlines for the various phases of the action; to stick to the planned intervention till its completion and/or its validation, without leaving incomplete works.

**Actions at different levels**

The actions intended to implement walking friendly policies pertain to three different levels.

**Actions meeting the demand of knowledge** - Information coming from research and practice can be spread among technicians and decision makers through training, education and exchange, involving many interacting figures in order to communicate basic data, methodologies, analyses and comparisons with other similar processes. In particular it is very important to deepen the knowledge of users' needs for avoiding interventions that miss their objective or satisfy only minimal requirements. Audits before the implementation (analysis of pedestrian activities, of the situation from the pedestrians’ viewpoint) gathering information not only on quantitative aspects but also on qualitative ones could be advised. The “Happiness rate” of the persons walking in the urban environment is the best test of a pedestrian friendly policy or implementation. The definition, and application, of a happiness indicator could be then very appropriate and useful.

**Actions aimed at raising funds** - For promoting more city investments in pedestrian public spaces, allocating specific budget lines, it is first of all necessary to increase the awareness of the various potential contributors. Then it is important to explain that the pedestrian friendly policy is a long-term matter, which has to take care not only of the implementation

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21 For more information on the families of solutions, their articulation and interrelations, and for a deeper description of the measures it is possible to refer to: Martincigh, L. and Urbani, L., edited by, “PROMPT WP7: Solutions Report”, based on the contributions of: Kari Rauhala and Saija Niskanen (VTT, Finland), Lucia Martincigh and Luca Urbani (DIPSA, Uniroma Tre, Italy), Willi Husler and Ingrid Schmid (IBV - W.Husler AG, Switzerland), Liv Øvstedal and Eirin Ryeng (Sintef, Norway), Philippe Hanocq and Marc Sermon (CRAU - Ulg, Belgium), Catia Rennesson and Bernard Patrice (CERTU and CETE, France) in: “PROMPT – new means to PROmote Pedestrian Traffic in cities”, co-ordinator: Kari Rauhala, VTT, FI. For further information, see: [http://prompt.vtt.fi](http://prompt.vtt.fi) (Last update 25 Oct. 2005).
(new development, upgrading, equipment, furniture, lighting, vegetation etc.) but also of the maintenance routine. A way of ensuring financial help to communities involved in pedestrian planning is drawing up incentives, or penalties as road pricing, parking tickets, sanctions against un-respectful drivers etc.

Table 1. Scheme of the implementation process (from Philippe Hanocq’s contribution to “WP7 – Working out solutions”)

<table>
<thead>
<tr>
<th>Phasing</th>
<th>Main Operators - Initiators</th>
<th>Main Tasks</th>
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| Phase A: TO PROVIDE BASIC INVOLVEMENT CONDITIONS FOR IMPLEMENTATION OF WALKING FRIENDLY POLICIES | Mainly GLOBAL (International/Federal/Regional) | Definition of appropriate basic conditions for implementation:  
- Give the necessary impulses at the beginning of the implementation process  
- Ensure political coherence (in space and time)  
- Define an appropriate legal framework (minimal demand, control of process and results)  
- Define a financial framework (organisation of eventual transfers) |
| Phase B: TO PROVIDE NEW MEANS FOR NEW POLICIES | GLOCAL (Federal/Regional+ Local) | Valuation of:  
- Human means - Necessary expertise, studies  
- Financial means - Financial planning  
- Technical means – Needed technologies and tools |
| Phase C: ACTIONS INTENDED TO IMPLEMENT WALKING FRIENDLY POLICIES | Mainly LOCAL | - Achievement of priority interventions at research and planning levels  
- Achievement of priority interventions at operational and legislative levels  
- Achievement of priority interventions at incentive and communication levels |
| Phase D: FOLLOW-UP OF IMPLEMENTATION PROCESS | GLOCAL (Local + Federal/ Regional for synthesis) | - Proposals for improvement of basic conditions  
- Proposals for improvement of interventions |

Incentive and communication actions - The pedestrian issue needs to be promoted by a positive image, as actually happens for the car. Walking has to look so young, fun, cool and trendy that it makes people think the motorized vehicle as boring. Campaigns in this sense have to be started. It is important also to boost the self-esteem of the targeted stakeholders. The appointment of a “Municipal Ombudsman”, who takes care of the mobility problems reported by the most vulnerable users, tends to make people feel more respected by the authorities and thence more gratified. The community has to participate to the whole design process from the decision to the implementation level. Communication, between authorities and dwellers, has to be programmed for listening to suggestions and for negotiating. In return, the community groups may help, eventually contractually, for maintenance and surveillance of the public areas.

Follow-up of implementation process
The pedestrian policy has to be continuously checked and improved. The public authorities should provide an “observatory cell”, which will perform various tasks: “Before and After Studies”, analysis of the results, suggestions for improvements; routine enquiries among residents and users; updating on the international best practice or innovations, evaluation and review of the whole design process for the feedback to the local authorities, with suggestions on eventual interventions for improvement.
FoS. 2: Implementation of policy regarding localization of facilities

It is necessary to improve the actual policy for the distribution of the shops, providing more targeted recommendations to apply in land use and transport planning, in order to guarantee a sufficient supply of goods and services in each district of the city and to prevent the competition of big shopping centres out of town.

Location of facilities at little distance
In each urban district the supply of goods and services of daily and weekly need should be easily reachable on foot. Some distances are recommended: 300-600 m, respectively for shops of daily and weekly use; 360 m at the maximum for public transport stops; up to 500 m for meeting points; from 30 to 200 m for children playgrounds. It is moreover advisable that in every neighbourhood there is at least one centre for youngsters.

Set up promotion of daily and weekly shops and services
In land use planning, directions should be given for locating shops, services and facilities in areas near public transport stops. The local authority should promote such layout by incentives.

A policy forbidding the building of isolated shopping centres
The actual trend of building few, big and far shopping centres has to change, or at least this choice has to be supported by the public transport service. This, not being economical for the lack of a sufficient density of inhabitants, has in its turn to be supported by some funding. It is necessary to issue a law that indicates the specific requirements to be fulfilled by these shopping centres: location near a public transport stop, contribution to the public transport costs at the shopping centre owner’s expenses, contribution to support the public transport costs by the fees set for parking.

FoS 3: Living streets day and night
Pedestrians need to move in an environment that makes them feel secure. For this reason they prefer to walk, especially in the dark hours, in streets that are full of life. Streets though to be alive, day and night, should have specific characteristics.

Mixed uses in districts
The presence of enough dwellings, at ground and first floor (guaranteed by norms), and a variety of public services and facilities (shops, restaurants, kiosks, meeting points etc.), along the streets and in their vicinity (guaranteed by norms that state their presence in every sub-district), together with the multiple use of public spaces for unofficial activities and with a social mixture of people and events are the possible features apt to achieve the goal. It is recommended a minimum 50% share of flats per sub-district, a minimum 10% share of facilities, a maximum 50/100 m of street length with blind facades, at ground and first floor.

Continuity between private and public realms
Inhabited buildings that maintain a relation with the streets don’t make people feel lonely when walking. Secure and comfortable spaces can provide an appropriate continuity between private and public realms but also some kind of separation, guaranteeing varying levels of privacy. No long high walls, fences etc. along the streets; no continuous, opaque noise barriers along sidewalks; no overwhelming parking lots.

Loose borders between buildings and streets
Buildings should have direct access on the streets and facades should have windows at ground floor for not creating a barrier effect.
**FoS 4: Give priority to pedestrians in transport planning**

“Give priority to pedestrians”, in broad sense, means to change the usual perspective of transport and land use planners. Model and analysis approaches, commonly used in transport planning, often don’t consider pedestrians, or do not support pedestrian “flows”. A new approach, considering pedestrians as the core of the travel chain, should be used and, as a consequence, space should be provided, organized and designed on purpose. Three phases can be devised; each one of them is characterized by some possible solutions, which can, on their part, be implemented by various possible measures. (Tab.2)

Provide the space: 50% of public space to pedestrians
The first basic phase of the process concerns the provision of space for pedestrians. The amount of such space must be substantial, at least half of the outdoor public space at disposal, and its location must meet pedestrians’ expectations, related to the reaching of facilities and to the performance of various social activities.

An interesting study, carried out in the nineties of the twentieth-century, puts clearly into evidence that most of the functions the street has to fulfil, beside transport, are associated with aspects, interrelated among themselves, in which pedestrians, nature and town structure/architecture play a main role. The street then should be dimensioned and designed to host appropriately all of them too.

Actually various strategies are used to regain space for pedestrians, but a legal provision (norms, standards and so on) that considers the pedestrians’ right to space for walking and for sojourning, and that fixes its quantity consistently, is missing at national level. It could be devised, for example, as it has been already made for traffic safety, including pedestrian safety, a “National Law or Program for Pedestrians’ Right to Space”.

It is possible to attain the required percentage acting at different levels. Urban planning gives a high percentage of the public areas to services, and among them to green spaces and outdoor facilities, to roads and walkways within, but actually only about 10% of the public areas is devoted to pedestrians (in part walkways and in part space for services and facilities). To increase this percentage, it is possible to work on three different areas, organizing and designing them in a different way: roads; services and facilities, especially green areas and outdoor spaces directly related to buildings (churchyards, schoolyards); private areas, generally courtyards or regulation distances. Specific calculations have been made for devising “three quantitative indicators”, related to different urban densities, to be inserted in the urban planning norms or to be recommended for use in town planning or in urban sites recovering.

Moreover, as it concerns roads and green areas, two more proposals have been made: “A balanced use of the street” and “A green network”. The former describes as street sections, especially in local streets, could be re-organized for the ratio carriageway/sidewalk. The latter explains how existing green spaces, of various type, could be put in connection, in order to design a green pedestrian network that uses, in a certain percentage, such green areas and that links attraction poles of different kind (See also FoS 5).

Organize the space: A continuous and dense pedestrian network
The supplied space has to be organized with pedestrians in mind, both for walking and for sojourning, either for the unavoidable activities or for the leisure and social ones. Therefore a pedestrian network with, at least, the same dignity of the vehicular network must be

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23 Estimation made in the research PROMPT for Italy.
24 Please see Note 20.
organized. It has to be characterized by the possibility of walking along a continuous route and by various classes of spaces that allow different uses; the whole guaranteed by pedestrian priority and designed at “pedestrians’ size”.

Table 2. Flow diagram (from Lucia Martincigh’s contribution to ‘WP7 – Working out Solutions’)

As the vehicular network is characterized by various types of roads and streets, the pedestrian network has to be characterized by various types of spaces, different not only for the type of priority, for their morphology and dimensions, but also for the way in which they can be used and for the way in which they are structured (relation among various transport modes, connections among spaces, hierarchy and sequence). Such pedestrian networks have to be structured so to host, time by time, the separation or the coexistence of different types of mobility, motorized and non-motorized, with various mutual benefits. This choice brings to a system of appropriate sidewalks and walkways, dotted by pedestrian areas, mixed together with, and supported by, a calmed vehicular mobility (See also FoS 6). In the decision and design process all the parameters, “peculiar” to pedestrians, should be considered (space “bubbles”, required effort, outdoor comfort, facilities etc.).

Pedestrians’ transport time is mainly ruled by distance, energy spent and pace; distances should be reduced as much as possible so to be easily affordable, height differences and, most of all, detours should be avoided. Therefore it is important to have no too large building blocks and insufficient or bad positioned crossing facilities, or to create shortcuts, indoor or outdoor, using spaces inside private buildings or in courtyards; for assuring a good density, thresholds have been defined for block dimensions, for crossing distances and for the lengths of the links.

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26 For the thresholds please see Notes 8 and 9.
Pedestrians’ paths should be as much as possible continuous. The continuity of the path can be implemented at physical, at visual and at perceptive level by specific detail measures; the first is referred to the actual physical possibility of moving safely without interruptions; the second refers to the possibility of having a visibility field free of obstacles in front; the third refers to the feeling of being threatened by vehicles which intrude too much in the pedestrians’ “bubble”, and so don’t let them feel safe and at ease. The intrusion is not only due to the static presence of the vehicles, but also to the air movement or noise due to the high speed of cars passing by, or in front.

Design the space: Design according to actual behavioural patterns - Architectural design of the space

The design, or re-design, of the urban environment has to be aimed at satisfying the expectations of the most vulnerable users as regards “liveability”. Such improvement implies a special attention to the main aspects that characterize the environment, that is, on the one hand to the physical structure where people spend their everyday life, and on the other hand to the social structure and to the ways of life. To increase the liveability of the spaces, it is basic to devise an environment configuration capable of meeting, in quantitative and qualitative terms, all the material and immaterial requirements of the users, by giving the required performances. Moreover, since the street layout should induce users to “legal”, predictable and at the same time comfortable and safe behaviours, it becomes crucial, in designing urban streets, to understand, making methodical observations, and to take into account users’ behaviours, and in particular pedestrians’ ones.

Since the aspects to be faced are manifold, the design has to be looked upon from various points of views and at several scales; to re-create liveable districts, it seems to be necessary indeed to manage, in a synergic way, the aspects related to the mobility reorganization and those related to the improvement of the intermediate spaces overall quality, determining the relations among the specific techniques used for planning them. In particular the design of the space must consider all the actors, find solutions that communicate them the right messages and make them feel at ease.

A good design has to take into consideration the hierarchy of the spaces, alternations of squares and swellings, pedestrian streets or simple walkways; it has to organize them as a sequence and to characterize them by legible elements, for forming a network that is recognizable by pedestrians. The space, therefore, has to be structured in two ways: horizontally, creating a morphologic variety, and vertically, considering the dimensional relation between the width of the streets and the height of the buildings. Pedestrians can indeed feel overwhelmed or lost in a space that is not correctly proportioned; the same can happen when the architectural design of the buildings, or of the pavements, is not attractive. Different materials for different uses and destinations can help pedestrians in their perception of the space; good treatment of the entrances helps pedestrians to recognize the place they are walking in; points of reference, intermediate destination points and cores help pedestrians to walk longer paths without realizing it. The design of the space is also related to the urban structure; the recognizability and the organic spatial unity of a neighbourhood can be strengthened by the enhancement of boundaries, gates and morphological differences that help pedestrians to feel at home (See also FoS 9 and FoS 10).

In the design it is then important to deal contemporarily with two different perspectives, on one side with the people’s needs and behaviours, and on the other one with the propositions of the urban environment.
FoS 5: A green network in every city

Policies on green areas should have the aim to give everyone the possibility of reaching on foot every part of the city by pleasant paths, alternating “grey” and “green” areas and passing as close as possible to everyday life places.

Built spaces interlaced with densely interconnected green nodes

The idea is to use or enlarge existing, or even create new, green areas (parks, gardens, squares etc.) in the core of every urban neighbourhood or district, residential or not. These “green nodes” are to be connected by “corridors”, that is green paths created along streets or inside green areas or courtyards, in order to host non motorised transport modes (walking and cycling). Such ideal grid, making use of the opportunities existing in each area, has to be adjusted to the ground situation. Between two green nodes there should anyway be a theoretical distance of about 400 m and each green node should have a catchment’s area of about 200 m, so to assure every resident a direct access.

Provide not only paths for walking but also for leisure

The green paths should penetrate up to the city core, serve all the districts and enable to reach the outer parts of the city. Alternative layouts are proposed for the design of the green network. The paths can constitute the connection not only among green nodes, but also among public services and transport stops; they, equipped with various facilities and characterized by various typologies of green, can also offer relaxing places and develop local identity. Recommendations concern: the issuing of adequate norms; the involvement of residents in the planning; the use of every type of public open space, and when possible of semi-private ones, to provide shortcuts inside courtyards; the use of corridors as buffer zones. 27

Blue and green structures with their seasonal variations, integrated in the design

In the green network it is possible also to integrate, as features to look at and to perceive, rivers, seaside and other water/wet surfaces present in the city. The colour of the water, changing with the weather, together with the changing colours of the tree leaves produce a variable environment that maintains people in relation with the seasonal and yearly rhythm of nature. Such integration could be planned, involving citizens, also functionally, by reorganizing the blue structure sides for hosting non motorized mobility, urban amenities and for improving urban sustainability.

FoS 6: In each development, consider that you have to move as pedestrian and not only as car driver

This new approach, based on the design of the urban and traffic environment with pedestrians in mind, calls for a complete re-thinking of the process, from the research to the implementation level. The objective is to propose solutions that guarantee a balanced use of the public spaces and enable pedestrians to move freely as every other user, thanks to the mutual respect, This can be done analysing the possibility of giving pedestrians a general priority in some areas, applying new solutions for mixed traffic and coexistence, supported by systems of measures for controlling speed. The solutions and the measures to apply are many, and are listed in Table 3, here only three of them, apt to reach the main objective, and strictly interrelated, are described.

Soft spaces, between totally pedestrian precincts and 30 km zones
This intermediary concept is already applied in some specific zones, usually in residential areas or shopping districts; the choice of the site is often the key to success. The main characteristics are: speed limit at 10-20 km/h, space shared by all the users, general priority to pedestrians. Pedestrians’ needs are taken into account, the possible interlacing of uses is checked and the "natural" coexistence is enhanced. This concept is applied, with different nuances, in some countries since long time, in others more recently, for example in the Netherlands (woonerven), in Great Britain (home zones), in Switzerland (zones de rencontre) and in Italy (natural coexistence). Differences can be noted in the street design, in the traffic management, in the signs, but all the layouts aim at improving the street environment and at organizing the traffic flow in a way that is suitable to combine safely all road users, in order to enhance the urban quality of life.

Control speed by design
For giving back to the streets their role of hosting urban social life, taking place only where all the users share the space in a convivial way and a mix of activity is present, it is necessary to moderate the speed of the motorized traffic. Only in this way safety is guaranteed also to the most vulnerable users. Speed has to be reduced by the street layout itself. Drivers can be compelled to slow down by the well-known traffic calming devices, used in a systematic way, but they can be also influenced by the street design, that is different depending on its function. The street then must be self-explanatory; it has to convey the right message to the drivers, who will in change adopt the right behaviour, congruent to the perceived message and to the street function. To achieve this result, the design has to consider the three-dimensional morphology of the street and work not only on the ground surface but also on
the sides; all the street components (natural and artificial: pavement, materials, colours, lighting, equipment, trees etc.) should be used to induce the right behaviour in the drivers. The study of the best measures to use to this latter aim has to be made together with the study of the best street layout for the pedestrian users, depending again on the street function; if this double approach is kept together, the result will be twofold: good legibility of the street for drivers and safer, more liveable and more appealing street environment for pedestrians.

Give pedestrians general priority in traffic
The right of way of pedestrians is ruled by traffic codes in different ways, depending on the country. It would be appropriate to try to harmonise the matter without excluding specific adaptations. In the zones where the layout is suitable for a high coexistence and the vehicular speed is very low, it is timely, and possible, to give the right of way to pedestrians all over the area. The priority should then be guaranteed and reinforced at pedestrian crossings, without or with traffic lights; in the latter case the priority should be made evident by the waiting times (short red) and the crossing time (long amber), measured on pedestrians’ needs.

FoS 7: Public transport for all
In cities, in towns and in less dense settlements it should be possible to support walking with public transport when farther destinations, related to the various performed activities, have to be reached. This goal can be achieved, having a public transport system sustainable in economic terms, i.e. if the travel chain walking-private motorized transport means decreases in favour of the travel chain walking-public transport means. The use of public transport can become attractive if a good service is supplied in terms of network density, comfortable means, timetable, accessibility for all, and reliability.

Sufficient supply of public transport and short distances to stops
A dense network of trams and buses, with stops located at a distance that is not too long to be covered on foot, enables everybody to reach one of them, leaving home or coming back from every destination, in order to reach other destinations and other faster lines. To this aim the average distance among stops should be about 400 m (250-400 m), the distance between parallel lines about 600 m, the catchment’s area around the stop about 300 m, measured as bee line: a walking time not longer than 5 minutes. In smaller towns or less densely inhabited areas, at late time and on weekends, the public transport should be flanked by alternative collective transport means (call buses, collective taxis etc.).

Quickly and easily accessible public transport stop and vehicles for all users
The connection to the stops must be by short paths, without detours, accessible and comfortable for each category of users (no steps or steep ramps), safe (easy pedestrian crossings) and secure also at late time (life also at night, with mixed uses). At the stop, enlarged sidewalks reduce the number of lanes to cross, also in the case of mixed traffic; wide middle islands (min. 2 m) avoid cars overtaking; a pedestrian crossing, along the whole stop, enables people to reach safely stops situated in the middle of the street; traffic lights with the green phase coordinated with the bus or tram arrival enable people to reach the stop on time. For making the stop and the transport means accessible to all users, wheelchair ones included, different solutions can be adopted: appropriate height of platform (14-30 cm, depending on the relation vehicle/platform); raised lanes along the stops, or humps in correspondence of the wheelchair access, for entering the means at level; special kerbstone for a perfect approach to platform (no or minimum gap).
Sufficient, secure and comfortable bus stop spaces, day and night
The space dedicated to the stop has to be sufficient for all the passengers, and in particular for the people with reduced mobility, either waiting or getting on/off the public transport means; it can be 1-2 sqm per passenger waiting at peak hours plus 10% of space for seats, with a minimum width of 2.50 m. The stop has to be equipped to be comfortable and secure, with different weather conditions, in all seasons and at any time; facilities open also at night and a good share of flats should be located around the stops area; entrance to buildings should face the street (See also FoS 3). Information and timetable must be easily readable by all passengers.

FoS 8: The public space as a living room
The pedestrian environment should provide places where people could spend their time outdoor in the same safe and comfortable conditions in which they spend their time indoor, at home, finding whatever they need for walking and sojourning. If such places are designed with the pedestrians’ point of view in mind, users will feel at home. Two subgroups constitute this family of solutions; the first, concerning financial issue, has been dealt with in FoS 1, where it appeared too; the second, related to design and detailing, is mentioned here.

Pavements for pedestrians: free of obstacles and of high quality
The design and the materials of the sidewalks should be decided thinking to the different users and transport modes. A mixture of slopes and stairs makes a change of level accessible to everyone; the use of special tiles can make the paving a means of information, for example to advertise commercial services, to indicate special access points at bus/tram stops, to help orientation (See also FoS 7), the use, at the same time, of different materials and colours can help visually impaired people besides creating a more lively atmosphere.

Also the management and upkeep should follow this rule for allowing a differentiated use; for example in the countries with very cold climate, part of the sidewalk can be left un-sanded in wintertime for allowing the use of sledges and skies.

Differentiated and appropriate lighting
The lighting is essential for walking easily and safely, and for creating a feeling of security. Lighting contributes to the attractiveness of the pedestrian spaces too, highlighting its identity; it can be used to underline specific features of the environment as monuments, squares, sculptures and vegetation, to create night landscape art but also to put unpleasant environment and objects in shadow. The position of these apparatuses is very challenging, for obtaining the best balance between the pedestrians’ safe freedom of movement and the lighting requisites. It is very important to design an integrated system that considers traffic lights, lights for pedestrian paths, lights for obtaining special effects (See also FoS 9).

Good design and maintenance of urban furniture
Urban furniture has the role of achieving cohesion and socialization in an outdoor public space, besides representing a functional facility (seats, wastebaskets). It is very important that it is chosen and positioned after having identified the activities that are to be performed, and that its design meets the different users’ requirements, in particular as to the various types of seats, that are a basic support for who uses walking as a transport mode. If it has a friendly and appealing design, and it is well kept, it communicates a feeling of security that attracts people. It would be very useful to organize and promote competitions for good design of urban furniture, corresponding to people activities and requirements.

For a liveable public space, great consideration has to be given also to all the components that can be used to protect pedestrians from adverse weather conditions, both in winter and in summer, in cold and hot climates (eaves, tents, wind screens, fountains, green etc.).
**FoS 9: Pedestrians have always to feel at home**

Natural, architectural and perceptive features give the city a set of positive qualities, and thus offer pedestrians good experiences and additional values. In urban design it is then very important to enhance the peculiar characters of the town/city environment for strengthening people’s sense of identity, to improve the legibility of the spaces, to consider different moments of the day and of the year, to highlight differences and potentialities of public spaces. In order to achieve the goal of making pedestrians to feel at home, three important conditions have to be considered: changing images, local Identity and lighting.

**Varied sequence of images for pedestrian spaces**

In some places nature and topography contribute to offer different views at every step of the itinerary. In these situations the challenge is to make the most out of these subsequent changing views without blocking them by building too intensively or on a large scale. In other places the difference in building periods and styles gives the needed variety. Pedestrian shortcuts (See also FoS 4 and 5) often add to the variedness along an itinerary, as they often represent a quieter, greener or narrower stretch compared to the busier streets. Seasonal changes must be considered and enhanced in the design, for example water and vegetation give different images depending on light, wind, temperature etc. (See also FoS 5). The sequential variation, typical of the antique city, built at “pedestrians’ size”, can be attained designing the spaces as a movie, introducing diverse elements with certain intervals (blind alleys, loops, sharp bends, changes in level, area entrances and exits, varied facades, different sizes of space etc.).

**Enhancement of local identity by a design of urban space appropriate to the character of the town**

The identity of a space offers the pedestrians a unique experience associated with that specific place, making them feel at home and enhancing their sense of belonging. Strategies to strengthen the local identity can include measures that enhance and preserve local features related to history, landscape and architecture, avoiding repetitive models. The design of every element of the urban space should harmonize with, and boom, the local distinctive character; it is then advisable to use local materials, colours, vegetation, architectural styles etc. In this search some dilemma can arise, for example concerning appropriate paving in historic areas and the need for smooth surfaces without hindrances for elderly and mobility impaired people, for persons carrying prams, luggage etc. In some cases, when reintroducing various types of rough paving stones, the designers reinterpret an old solution that offered a differentiated use of the street; for example cobblestone matched to flagstones, that earlier served as smoother pavement for cartwheels, while now clearly identify the space for people with difficulties in walking, carrying something or for cyclists.

**Natural and artificial lighting for creating different atmospheres**

Using light, as one of the component of the design and as an artistic measure, makes possible to create different images during the day and night. Exemplifying are inanimate rocks by daytime that can come to life at night, when mysterious lights appear from inside, through fissures. A well-studied lighting of the street can offer a special experience and a different atmosphere during the dark hours. Also daylight and sun shining can imbue the street design, from the layout to the detail. For example, a seat can be designed as a sunflower to enable people facing always the sun, if wished, or choosing to socialize or not with others.
FoS 10: Integrate the pedestrian scale in city design
Pedestrians have to be at the centre of town planning and urban design. Decision makers, planners and designers should tailor the solutions to the perceptive interrelation of the pedestrians with the urban environment. From this point of view, the scale aspect, already faced at town planning level (FoS 2, 4, 7 and 9), takes an even greater importance at urban texture level.

Friendly looking architecture design
Who walks goes at a speed that makes possible to notice and to appreciate all the aspects that characterize the environment, therefore public spaces, as well as buildings and details should be at pedestrian scale. Actually people walk mostly in city centres just because they perceive them as attractive. They offer indeed interesting views and features, as height of buildings, width of streets and squares, details of facades and various artefacts (fountains, sculptures etc.) that correspond to pedestrians’ expectations and desires, and go along with the pedestrian “bubble”, pace and view angle. Visual impact is one of the important criterion pedestrians use when choosing their itineraries, above all for strolling. These considerations should be at the basis of the design of the public spaces located outside the city centre too. As already said, there should be varying views and changes of scene, meandering paths but also a hierarchy of spaces, gateway effects and other elements of the landscape that offer surprising sensory experiences, as sounds and lights, works of art at human dimension and vegetation. Too long and monotonous facades should be avoided; the buildings should be highly detailed especially at street level with niches, bays, corners and entrances. The pedestrian space should be designed so that pedestrians feel that is made attractive and lively for their pleasure, enriching it with greenery and facilities such as outdoor cafes, kiosks and stands. Considering people's “mind maps” could help to define desirable environments and could give new more appropriate ideas to designers.

FoS 11: Standards for acoustic limits outdoor
Besides preventive measures including norms and standards for acoustic limits outdoors, it is necessary to act through land use policies and urban planning to put activities causing noise far from residential areas and from spaces where pedestrian activities mostly happen. At design level, landscape studies can be made and measures for disguising negative sounds by positive elements can be applied. It seems also important to act on the education or sensitisation field for improving behaviours of drivers and people on sounds levels. Below the most important solutions are listed.

Urban planning and strategic measures
Plans for acoustic zoning, calm zones, protected parking, geometry optimisation, sound absorbent street paving etc.

Creative design and landscape studies
Green acoustic barriers, facades design, disguise of negative sounds by positive elements (for example, use of the sound of water for camouflaging noise) etc.

Rules and education to control sound level
Noise checks, traffic regulation, taxes, fees and incentives, civic education, health and social campaign etc.
FoS 12: A clean and healthy outdoor space

This aspect, often neglected, is of main importance, as asserted by the first statement of the “Charter of the Rights of the Pedestrians”, adopted by the European Parliament. Solutions deal with poor environmental performances, going from air pollution to smells and negative visual impacts caused by garbage and organic waste. The measures are of various types: preventive, restrictive, strategic, of management, of maintenance, creative and financial.

Education of dog holders and provision of dog facilities

The problem of dog mess on sidewalk or on green is very present in the public opinion. Rules exist but are not always respected and applied. Sensitisation campaign together with a spread provision of attended specific waste disposal and a greater number of attended reserved areas for dogs could improve the situation.

Provision of appropriate disposal for garbage collection

The problem of garbage, especially in compact and dense cities, lays not only in the disposal but also in the collection and management. These, together with a good design, are the fields of intervention to eliminate the bad smell, especially in hot and warm climate, and the visual pollution. As possible solutions, collection routines, waste bins deposit or disguising, private initiatives, concerning waste removal and street cleaning, have been analysed.

Maintenance programs and strategies

Maintenance is very important to keep the outdoor spaces in working order. Good operational arrangements as for example contracts between municipalities and advertising companies for the maintenance of street furniture and facilities (public toilets, bus shelters etc.) at no cost, routine or systems for paving upkeep, dust reduction etc. constitute possible solutions.

Standards and strategies for controlling air pollution

Air pollution can induce many people not to walk; information on air pollution levels has then to become handy for everybody. Monitoring is also very important for pollution reduction plans; emission checks for cars should be yearly and occasional on-street checks should be severe. For reducing air pollution, activities that generate high traffic volume should be located along public transport lines in order to decrease car traffic; roads passing through the centres of villages or towns should be designed to reduce speed; environmentally friendly vehicles should be promoted also for public transport system. Finally, sensitisation campaign and education programs in school have to be continued and stressed more.

4.2. SIZE Solutions

The systematic approach used in the research SIZE in order to define guidelines and recommendations for policies and implementations, that are appropriate to fulfil the goal of keeping senior citizens mobile, and in particular of creating an agreeable urban walking environment also for them (already mentioned at Section 3.3.), points out the multiplicity of choices and of routes that can be taken to reach the goal. A collection of solutions of different type, that can be considered transnational, has been proposed; they have been attributed to specific problems, detected on purpose, as alternative solving tools; each one of them is broken down in many measures to choose among, depending on the specific local situation; all the selected measures have been collected and described in a catalogue.

Among the solutions to recommend, eleven have been rated as the most urgent ones in relation to the most frequent eight problems to solve; for each problem a list of the most
agreeable alternative solutions and measures that is possible to use has been worked out; this helps to build a possible strategy for an intervention made step by step, involving various levels and fields of action. Here only the solutions related to the walking environment and to public transport are described, following the order used in SIZE, problem by problem; for each one of them are reported only the measures that have obtained the highest assessment, and that therefore are the most agreeable to senior pedestrians. ²⁸

Even if these solutions concern senior citizens, and reflect their opinions, as already repeated many times, solutions that are good for the most vulnerable users make life easier also for the others; therefore they can be useful references. Some of them follow, in some way, PROMPT solutions and measures while others are different; these will be dealt with in a deeper way.

**How to protect pedestrians from inconsiderate car drivers and un-respected speed limits in residential areas**

The solutions that can be adopted are related to many fields of action. They can act directly, through control and enforcement, or indirectly, through a particular street design, inducing drivers to behave properly, or through campaigns, making drivers more conscious. For obtaining a full result, it is possible to outline a scenario that combines different approaches and mixes measures that can be applied at short term with others at longer term: improving the feeling of safety by more police presence, decreasing risk by more protected spaces and by street design that induces a slow speed, increasing awareness by spreading a new urban culture.


**How to protect pedestrians from vehicles that drive or park on sidewalks or footpaths**

It seems that seniors prefer solutions acting in two directions: on infrastructure and on control and enforcement, with a unanimous preference for the latter. In the case of street design, preference is given to two alternative measures: to provide specific paths for each transport mode that hasn’t a speed compatible with pedestrians’ pace and to defend pavements from vehicle invasion. Among the measures to obtain the latter, preference goes to the use of an appropriate kerb more than to bollards; these probably are seen by seniors as a possible danger, if not designed in a way appropriate to meet their specific exigencies, consequent to their low sensorial performances.

*Increase control: the district policeman. Location of the curb. Appropriate design of the curb. Creation of cycle paths.*

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²⁸ For more information on the solutions and measures, and for reading the forms that describe them, it is possible to refer to: Martincigh, L., “Guide-book of SIZE recommendations for improvements in transport and mobility that enhance life quality of senior citizens in Europe”, Deliverable D17, Report from WP12, based on the contributions of: FACTUM, Chaloupa & Risser OHG (A); University of Erlangen, Nuremberg, Institute of Psychogerontology (G); National University of Ireland, Traffic Research Unit/Counselling & Health Studies Unit (IR); Lund University, Department of Technology and Society (S); Centrum Dopravniho Vyzkumu (CDV), Transport Research Centre (CZ), in: SIZE – Life quality of senior citizens in relation to mobility conditions, co-ordinator: Ralf Risser, FACTUM, A . For further information, see: [www.size-project.at](http://www.size-project.at) (Last revised 16 Aug. 2006).
How to prevent the handicapping conditions of footpaths

In this case the solutions belong above all to the infrastructure field. But if the effect of the interventions has to be maintained for long time, they have to be flanked by appropriate norms concerning the funding and management of the routine cleaning, control and maintenance of the pavements.

For improving pedestrians’ safety and comfort, it is important to provide better pavements acting on slopes and curbs, where necessary (low curbs, no stairs, no steep slopes etc.), removing obstacles along the paths (such as cars, litter bins, tree roots, pebbles, cracks etc.), using materials that are comfortable to walk on and programming a periodic maintenance.


How to provide more accessible public toilets in public spaces

In this case it is necessary to act at the same time in more different fields, but among them two are regarded as the most important ones: interventions in the infrastructure field and in the sign systems. The aim is to guarantee an appropriate number and location of accessible public toilets but also to make evident where they are. Maps, of various types, can help older people to know where toilets are available and to organize their route, on the basis of the distance and of their possible needs.

Appropriate number and location of accessible toilets in public spaces. Maps of public places indicating toilets facilities too.

Public transport means appropriate to older and mobility impaired people

In this case the only involved field of action is the transport field. It is necessary to substitute the old vehicles with new ones: kneeling, with low floors and retractable platforms that make access easier. Moreover it is helpful to place at the door of the bus, and in the carriage, a well spread number of grab bars and vertical stanchions. Also the taxis service should be improved providing a good number of taxis, increasing in time, fully accessible and comfortable (entrance, height, seats etc.).


How to make people behave correctly in public transport

The solutions here are of different kind, all important, and have to be applied at the same time, in parallel. They concern control and enforcement, through a better check of rules in public transport means, above all with regard to the seats reserved to the most vulnerable users; they concern also older people assistance and social approach, for example, by educational initiatives at school and campaigning. For supporting such actions, it seems also important, to attract attention on the problem using more visible signs. All these measures aim, on one side, at making older people feel more respected, understood and appreciated as one of the components of society, and, on the other side, at making public transport customers more aware of the problems of older adults. The high number of selected
measures shows the importance of this issue: the application of these measures has obviously also consequences on older people’s safety and comfort.  


5. Conclusions

It is worth to remember that the proposition of methods and tools to apply for improving the pedestrian environment cannot be separated from the consideration of some basic preconditions. 29

The knowledge of the actual deficits of the system on its whole, as well as of the remedies, has to be acquired, structured and shared among all the stakeholders so to become the basis on which to ground action.

Solutions can solve the emerged problems, they are there waiting to be applied, but no change will happen if there is no willingness to take action. It is important then to make the various authorities in charge to feel responsible, to coordinate them for sharing such responsibility and to encourage them by showing the possible rewards to their action.

Other preconditions are directly related to the realization of the solutions and have been already mentioned (Section 4.1. – FoS 1): opportunities for intervention (dedicated legislation, funding, stakeholders’ consent etc.), that make possible to implement the plans; technical tools and competence of professionals, that take to a design congruent with the different, more or less vulnerable, categories of pedestrians and with the local situation; high quality of the design, accompanied by high quality of the implementation, and of the following monitoring and evaluation process, that guarantees appropriateness, effectiveness and efficiency.

For what concerns the very important issue of the maintenance of the interventions, once implemented, another consideration can be made. People’s participation in the decision process increases their feeling of belonging to the place and their identification with the changes that are made; this in turn develops a sense of ownership, and consequently the respect and the desire to maintain, as long as possible, the interventions that they had wished and considered “good “ for them. This side effect has not to be underestimated because it can help to have decorous outdoor public spaces and to save on the cost of upkeep.

As regards the solutions for improving liveability, at tactical and operational level, from the experience already made, it seems right to try to meet pedestrians’ needs using a broad view, i.e. considering, at the beginning, all the Families of Solutions and then choosing a group of different measures that support each other and that have the same aim. This enables working at different levels at the same time, from general strategy and town planning to urban design and street details, from legislation to communication and education, from technical implementation aspects to social campaigns. The whole of these actions will constitute the structure of one of the many possible policies to choose, depending on the local situation, on the detected deficits and qualities, and on people’s expectations.

29 See also PQN Final Report Part A – Conceptual Framework, section 2.5 Intervention program development.
It is indeed very important to act simultaneously on more elements of the system and to integrate two or more fields of action, because it is not successful to rely only on one. For example a good strategy is to foster behavioural changes in the users and at the same time to change the urban environment in order to meet their expectations; to apply at the same time measures at prompt and at deferred effect, etc.

References


Assessment of pedestrian system output

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'We will be known forever by the tracks we leave'.
Native American Proverb - Dakota

Summary

Assessment of the overall value of a pedestrian system raises a lot of difficult theoretical issues which are dealt with very differently in various disciplines. The proposed assessment of the pedestrian systems output is inspired by settings from multiple disciplines, thereby combining dimensions with the aim to allow for a more transparent discussion of trade-offs and synergies between impacts and objectives.

The understanding of how the pedestrian system works is inspired by system theory. The pedestrian system is viewed as a dynamic, open, complex and evolutionary system. For the assessment of the pedestrian systems output, a homeopathic approach is proposed; the value of the systems output is addressed in terms of how well it reinforces the self-correcting, self-healing and survival mechanisms of the social, physical, economical and political environment.

When trying to implement these principles, ethical considerations related to the definition of ‘correcting’, ‘healing’ and ‘survival’ mechanisms can not be ignored. These are not necessarily directly related to the final outcomes, but to the process through which these final outcomes are reached. To complicate things further, the overall outcomes have to be examined in their distributional effects. A capability approach helps to tackle this dimension. Although there are not many applications at the macro policy level, the method is promising in the way it enables a structured discussion on benefits, distributional issues and ethics.

1. Introduction: Scope of the assessment of pedstrians system output

Understanding a systems output helps to provide justification for interventions and arguments for intervention recommendations. Awareness of the outputs environment can help to recognise potential threads and side effects, and anticipate on resistance or eventual needs for compensations. Therefore it is vital that this output be assessed, in order to enable the design of policies which foster desirable developments; as well as make errors along the way less likely and figure out which obstacles can be expected and how they can be overcome.

The evaluation of the pedestrian system output consists of one main question: what effects will (packages of) interventions have for general stakeholder interests and/or for society in general? This goes beyond the effects of interventions on the pedestrian travel & sojourn
system and satisfaction of humans in their role as pedestrian. If the pedestrian travel & sojourn system works because of the suggested interventions, what will it bring for the individual stakeholder, communities and ultimately society?

As stated in the conceptual framework, the pedestrian system functions in an environment, and continuously interacts with it in various ways (figure 1). In systems theory words, the pedestrian system is an open system.

![Figure 1 The pedestrian system is an open system](image)

In the conceptual framework, the input to the pedestrian system is defined as ‘either interventions or autonomous changes of the environment (…). Pedestrian have needs and the pedestrian system functions when these needs are fulfilled as represented in figure 2a. In other words, the system does not process input to generate output; it needs preconditions in the environment in order to function, i.e. to fulfil the needs of pedestrians. By referring to the input for the pedestrian system to function as preconditions, we can adapt the figure towards 2b. The scope of the assessment is the output of the system, rather than the functioning of the system itself. In the identification of pedestrian needs, sustainability of walking is considered a precondition because it is a human activity, and as such should not go at the expense of the survival of the community on the short and longer terms (reference: PQN Final Report Part A – Introduction and Conceptual Framework – section 3.1.3 on Needs). This is represented by a feedback loop (2c).

In order for the system to be sustainable, the output needs to have a positive or neutral impact on the preconditions. The output should be at least compatible, but preferably supporting, or limiting threats, or even reinforcing the possibility of the system to function. A few illustrations:

- the output reinforces the input: people need to be healthy in order to be able to walk. A pedestrian system that functions well, stimulates walking, and walking is good for health;
- the output limits threats to the input: empty public spaces may be perceived as unsafe. One output of the pedestrian system consists of bringing pedestrians in public space, thus reducing this un-safety;
- the output supports the input: more pedestrians are better heard by decision makers, and infrastructure is improved to meet the pedestrian needs;
- the output is compatible with the input: walking improves bonding with the environment, but one does not need to feel attached to an environment to walk there.
To what extend the output relates in a positive way to the preconditions for the system to function, is a key to assess the sustainability of the pedestrian system. There are different mechanisms involved. The basic principle proposed for the assessment of the system output, is to search for an answer to the following questions:

1. To what extent does the system output improve (reinforce, support, ...) the possibility to walk (for the individual, in the community, in society as a whole?)
2. To what extent does the system output improve (or at least not deteriorate) the environmental, economical, political and organisational context?
3. How robust is the system output to deal with individual, community, and societal threats?

In this last question several mechanisms can be considered, going from corruption, political opportunism of policymakers, negotiation processes where ‘I owe you’ may influence the outcome, etc. Dealing with these issues would lead us too far, as different normative systems – not all of them rational – can be observed. We refer to the chapter on compliance and satisfaction mechanisms for a better understanding of what types of threats can be expected, and how they can be understood and dealt with. In the following section, we further focus on the direct feedback in question 1 (output pedestrian system – input pedestrian system) and on the impact of the output on the context in question 2 (output pedestrian system – context).

2. How can the output of the pedestrian system to its (environmental, social, economical, political, organisational etc.) context be assessed?

2.1. System theory

Before the output of any system can be assessed, it needs to be specified. This is particularly the case for a complex system, such as the one we are dealing with. The structure of a complex system is not a simple feedback loop where one system state dominates the behaviour. Cause and effect are often not closely related in either time or
space, and there is a multiplicity of interacting feedback loops and nonlinear relationships. The complex system is of high order, meaning that there are many system states (or levels). It contains positive-feedback loops describing growth processes as well as negative, goal-seeking loops. The cause of a difficulty may lie far back in time from the symptoms, or in a completely different and remote part of the system. In fact, causes are usually found, not in prior events, but in the structure and policies of the system. In the complex system, when we look for a cause near in time and space to a symptom, we usually find what appears to be a plausible cause. But it is usually not the cause. The complex system presents apparent causes that are in fact coincident symptoms. The high degree of time correlation between variables can lead us to make cause-and-effect associations between variables that are simply moving together as part of the total dynamic behaviour of the system (Forrester J. 1990).

This leads us to the search of adequate methods to specify outputs of the complex pedestrian system. System dynamics offers a method for understanding the dynamic behaviour of such complex systems. The basis of the method is the recognition that the structure of any system — the many circular, interlocking, sometimes time-delayed relationships among its components — is often just as important in determining its behaviour as the individual components themselves. It is also claimed that because there are often properties-of-the-whole which cannot be found among the properties-of-the-elements, in some cases the behaviour of the whole cannot be explained in terms of the behaviour of the parts (Forrester J. 1990).

While there is a common agreement among system thinkers that a system is a dynamic and complex whole, interacting as a structured functional unit within an environment, the boundary between the system and the environment can be interpreted differently. These boundaries can be seen as permeable and variable in time and space. Evolutionary systems, similar to dynamic systems, are understood as open, complex systems, but with the capacity to evolve over time (Dyer, 2005). If we consider the pedestrian system as an open, complex evolutionary system, then the interaction between the system and its environment is not constant, and the systems outputs are indicative and flexible rather than comprehensive and fixed.

Because the output of the system influences the preconditions for the system to continue functioning, mechanisms inspired by the evolution theory (Darwin, 1859) can be used to assess the output: how well does the system fit in its environment?, how adaptive is the system?, which advantage does the system have compared to other systems?...

The next move with regard to the assessment of pedestrian system output is to find out which assessment and evaluation methods are available for this purpose, what data and information needs are, pro’s and con’s, choices to be made, criteria for choices, etc. An overview of useful evaluation methods is extracted from the European Impact Assessment Guidelines, for the assessment of non-market impacts, in particular to environment and health, and from methods of comparing impacts (European Commission, 2005).

### 2.2. Methodological considerations

**Cost-benefit analysis**

This entails identifying and evaluating expected economic, environmental and social benefits and costs of proposed public initiatives. A measure is considered justified where net benefits can be expected from the intervention.
Advantages:
- accounts for all (negative and positive) effects of policy measures
- allows comparison of the ordering of costs with the ordering of benefits of the proposal over time
- can also be used to rank alternative (including non-regulatory) proposals in terms of their net social gains (or losses).

Disadvantages:
- cannot include impacts for which there exist no quantitative or monetary data
- difficulties in establishing the social discount rate
- usually more expensive and time consuming than other, less broad, methods
- may lead to distributional issues being overlooked.

Cost-effectiveness analysis
This requires calculating the cost needed to achieve a desired outcome, allowing the costs of different options to be compared. It is an alternative to cost-benefit analysis in cases where it is difficult to value benefits in money terms. Cost-effectiveness analysis offers a ranking of regulatory options based on ‘cost per unit of effectiveness’ of each measure.

Advantages:
- offers a more relaxed approach towards benefit measurement than cost-benefit analysis
- useful to compare alternatives that are expected to have more or less the same outcome.

Disadvantages
- does not resolve the choice of the optimal level of benefits
- concentrates on a single type of benefit (the intended effect of the measure), excluding possible side-effects
- provides no assistance as to whether a regulatory proposal would provide net gains to society

Multi-criteria analysis
This term covers a wide range of techniques that share the aim of combining a range of positive and negative impacts in a single framework to allow easier comparison of scenarios and decision-making. The technique can be useful where there is a large amount of information on a number of different impacts, and that information is in different formats. It allows impacts to be presented that are a mixture of qualitative, quantitative and monetary and of varying degrees of certainty.

Key steps generally include:
- identifying the objective;
- identifying options to achieve the objective;
- establishing criteria to be used to compare the options (these criteria must be measurable, at least in qualitative terms);
- scoring how well each option meets the criteria;
- assigning weights to each criterion to reflect its relative importance in the decision, using e.g. participatory techniques, ethical principles, technical grounds or an interactive procedure with the policy-makers;
- ranking the options by combining their respective weights and scores.
Advantages
- recognises multi-dimensionality of sustainability
- allows different types of data (monetary, quantitative, qualitative) to be compared and analysed in the same framework with varying degrees of certainty
- provides a transparent presentation of the key issues at stake and allows trade-offs to be outlined clearly; contrary to other approaches such as cost-benefit analysis, it does not allow implicit weighing
- enables distributional issues and trade-offs to be highlighted.

Disadvantages
- includes elements of subjectivity, especially in the weighting stage where the analyst needs to assign relative importance to the criteria
- because of the mix of different types of data, cannot always show whether benefits outweigh costs
- time preferences may not always be reflected.

Risk analysis
This assesses the risk of an undesirable event occurring, and the possible consequences to individuals and to society if it occurs. Risk appraisals can then be used to determine the options available to reduce or eliminate the risk and/or its consequences.

To carry out risk analysis, you need to:
- identify the risk
- assess how likely that risk is to happen
- assess the potential impact to the proposed program / measure if the risk identified were to occur.

Advantages
Scientific assessments of risks make crucial contributions to regulatory decisions, especially in the areas of public health and safety, environmental protection, resource exploitation, wealth creation, innovation and national security indicating whether the policy will be effective in reducing risks in a significant manner.

Disadvantages
- risk impacts may be diverse and not commensurate (that is, brought into a common measure);
- does not normally involve an assessment of the costs likely to occur if the undesirable event does happen;
- takes no account of negative and positive impacts other than risks linked with the proposed measures to deal with the risk and/or its consequences;
- should not be used as the sole basis for deciding whether to take action or for determining the type of action to be taken.

Variants of these methods exist and can be used when appropriate. Examples are cost assessment, risk-risk assessment, etc.

We can also use techniques to value changes in risks of events occurring. This is extremely useful, indeed necessary, when looking at many environmental or health impacts. For example, many policies will try to reduce the risk of illness or death. We cannot – and do not seek to – place a monetary value on our own lives or on other individuals’ lives. However, changes in risks are a different matter. While no one would trade their life for a sum of
money, most people will be prepared to choose between safety equipment with different prices and offering different levels of safety, or between different ways of crossing a street compared to the saving of time. We can therefore identify the value individuals place on small changes in risk.

**Sensitivity analysis**

Sensitivity analysis explores how the outcomes or impacts of a course of action would change in response to variations in key parameters and their interactions. It may be that a single factor is crucial to the decision of whether or not an option is worth implementing. In such cases a useful form of sensitivity analysis is to identify how much the value of the factor would have to fall (if it is a benefit) or rise (if it is a cost) to make it not worth undertaking the option.

To carry out sensitivity analysis, you need to:

- Focus on the most important alternatives
- Search for switching value / point

**Advantages**

- it is often a good way to handle the analysis of uncertainties.

**Disadvantages**

- when dealing with complex systems this tends to oversimplify reality.

**The capability approach**

The capability approach offers an alternative framework, by starting from the individual well being (Schokkaert, 2009). The method offers a multi-dimensional perspective on well-being, integrating considerations of freedom and distribution. It focuses attention on final rather than intermediate objectives, and therefore on the overall structure of outcomes with feedback and trade-offs. Compared to the above mentioned more traditional approaches, the capability approach includes a concern for more qualitative dimensions. Currently, most applications of the method are at the individual level. At macro policy level, the method seems promising as it enables a structured discussion on benefits, distributional issues and ethics. Due to its young nature, the method needs to be used with caution.

**Conclusion**

All the proposed approaches suffer from disadvantages, which make them more suitable for some assessments than for other (see amongst others Hauer 2009). The main difficulty lies in the fact that an assessment is never value free. Even the choice of an assessment method is not value free. Aware of this limiting condition, we propose an empirical solution, combining elements from various methods.

2.3. The pedestrian system output assessment.

Homeopathy is founded on 'holistic' and 'vitalistic' paradigms, which may be interpreted - at least in part - in terms of a framework provided by the theory of dynamic systems and of complexity. The homeopathic systems approach is based on appreciation of three main properties of complex systems: non-linearity, self-organization, and dynamicity. The original goal is better understanding of homeopathic phenomena and therapeutic settings for human health (Bellavite, 2003). These principles can also be applied to other systems. In software development, for example, self-healing principles and processes are modelled and are increasingly applied to improve the robustness of the systems.
Homeopathy is often recognized in modern science as an applied approach of complex systems. Similar to the holistic concept, a complex system is like a network, where individual parts interact and influence the system as a whole. The system is seen as dynamic, not static. Within homeopathy for example, a person’s illness in a given location is an emergent property of the person as a whole, indivisible system, not something separate that is to be isolated out and treated. “There is self-similarity at every level of scale, down to the local parts. This self-similarity concept is parallel to the clinical notion in homeopathy that deep examination of any symptom will reveal the larger disturbance in the person as a whole,” (Bell, 2005).

This principle is very much in line with the basic principle proposed for the assessment of the system output (figure 2). If we apply this principle to the value of a systems output, the assessment is addressed in terms of how well it improves the self-correcting, self-healing and survival mechanisms of the social, environmental, economical and political systems. When trying to implement these principles, ethical considerations related to the definition of ‘correcting’, ‘healing’ and ‘survival’ mechanisms can not be ignored. These are not necessarily directly related to the final outcomes, but to the processes through which these final outcomes are reached. To complicate things further, the overall outcomes have to be examined in their distributional effects.

Aware that there is no perfect, neither universally applicable assessment method, we propose to reformulate our questions as:

1. To what extent does the pedestrian system output improve the objective and subjective preconditions to fulfil the pedestrian needs?
2. To what extent does the system improve (or at least not deteriorate) the self-correcting, self-healing and survival mechanisms which exists in the environmental, economical, social, political and organisational context?
3. How does the pedestrian system help achieve ‘higher goals’?

3. An evaluation of current and potential impact of pedestrian quality intervention programs

3.1. To what extent does the pedestrian system output improve the objective and subjective preconditions to fulfil the pedestrian needs?

In order to answer this question, the previous chapters on needs are screened in search for potential feedback loops. This exercise is not intended to provide a comprehensive overview, rather to illustrate how the question could be answered. Further elaboration is certainly possible on indirect effects, we don’t take interactions between system outputs into consideration, and the time dimension could be added to differentiate between immediate, short, medium or long term effects. Even with these restrictions, the exercise allows us to identify strengths and weaknesses of the pedestrian system in terms of how well it can sustain and/or reinforce itself.

*Homeostatic/subsistence feedback*

- Children need to be able to walk for their mental and physical health ↔ Children need to have sufficient mental and physical health in order to walk.
- Elderly have a better health and longer life expectancy when they walk ↔ elderly need to live and be healthy in order to be able to walk
- Routes to destinations or transfer points need to be conspicuous (findable), convenient (without obstacles), comfortably walkable, and safe and secure.
The extent to which the pedestrian system improves these preconditions, is very circumstantial. For example, finding a railway station or a tourist attraction in a city may be easier when many people walk towards it, but crowding may be uncomfortable, or even an obstacle

- Skill based level behaviour ↔ the more people walk, the better their skills to walk

**Psychological feedback**
- People need to a ‘territory’ to be able to walk ↔ by walking, the surrounding becomes part of the known territory
- Persons that are not confident about heir abilities to cope with situations under way (…) have strong needs to be certain that they will not get surprised by unexpected mishaps ↔ the more people walk, the more they can gain confidence about the route and about their abilities (as in this is ‘my’ bench)

**Aesthetic feedback**
- People prefer to walk where the aesthetics of the environment fit their lifestyle ↔ by walking people can express their lifestyle preferences (for example promenade in posh neighbourhoods, on fancy streets, …)
  - Because aesthetic experiences are person, group and culture related, this may be a negative feedback loop. Some pedestrians have incompatible tastes, or even dislike each other (for example, some people find noisy children annoying, the smell of people eating and drinking while walking may be disgusting to other pedestrians, …)
- Monotonous environment are less pleasant for pedestrians ↔ the presence of people (pedestrians) bring movement in the environment, and breaks the monotony.

**Social feedback**
- A convenient social climate and social cohesion, company, … are needed for people feeling better when walking ↔ walking can improve the social climate
  - It is important to mention that this is not necessarily the case. Depending on the context, there may even be a negative feedback: elderly people feeling unsecure walking where many youngsters hang around, women ‘not belonging’ in the street in certain cultures, … In such cases, walking by some may discourage walking by others

**Public/political feedback**
- The pedestrian system needs a political system committed to provide facilities and services (cf. The European Charter of Pedestrian’s Rights) ↔ the more voters walk, the more the political system will pay attention to their needs
- Conflicts with traffic need to be prevented; pedestrians need to be facilitated to cross major roads at for them convenient locations, and the speed of motor vehicles should not exceed 30 km/h at the crossings, in order to allow drivers to spot crossing pedestrians in time to stop ↔ when many pedestrians cross the street, they are more visible to drivers, and when many people walk in a neighbourhood, the number of crossing places may prevent traffic from driving at high speed. When there are conflicts in areas with lots of pedestrians, the pedestrians may very well win, i.e. prevent traffic from driving through.

The weakness of this approach is that it doesn’t consider ‘competition’. The pedestrian system may reinforce itself, but theoretically still be out-competed by other alternatives. For example, other ways of expressing lifestyle preferences may become more fashionable than walking in a fancy street. While this can constrain walking at a certain scale, in a specific environmental, economical, social, political and organisational context, it will never in fact, out-compete the pedestrian system. The main reason is: walking is a precondition for any
journey, even when it is complementary to the use of transport modes: one has to walk to the
car, the bus stop, ... The pedestrian system is nested everywhere in the transport system,
and by enlargement, in any system involving human beings. Some people have no
alternative but to walk to their destination, others are barely aware that they walk. *Walking is
a precondition for any system to function as a whole, not something separate that is to be
isolated out and treated on its own.* In this, we recognise the basic idea behind the design for
all principle.

When examining these potential feedback loops, it is important to keep in mind interactions
between different scales. The systems output at community level may reinforce or conflict
with individual needs (i.e. the need for privacy vs. safety), or the opposite may also be the
case: individual needs may conflict with societal needs, leading to malfunctions as
corruption, etc.

3.2. To what extent does the system improve (or at least not deteriorate) the
self-correcting, self-healing and survival mechanisms which exist in the
environmental, economical, social, political and organisational context?

Social climate/equity
How can one assess in how far pedestrians in the streets improve the social climate and
equity?

The example from ‘Streets to live by’ (Lusher et al. 2008), illustrates how the success of a
liveable street is measured by its outcomes in terms of the strength of the community. It is
clear that not all the system outcomes can be measured:

- **Street life.** The most fundamental measure of success is street life, and the simplest
  benchmark of this outcome is the number of pedestrians on the street during a given
  period of time.

- **Pedestrian volume.** Streets that are more attractive to pedestrians should draw more
  people for discretionary trips in the middle of the day, in the evening and on weekends.
  Thus, counts should be taken at various times of the day and night, and on weekends as
  well as weekdays. Gehl has also suggested calculating the ratio between summer and
  winter pedestrian volumes. He theorizes that if the street is only a conduit, and not a
  place for activity, these counts should not be significantly different. But a street that is a
  destination in itself is likely to attract more people when the weather is good.

- **Stationary activities.** Counted people standing, waiting for transport, sitting on benches,
  sitting on cafe chairs, sitting on secondary sitting-possibilities, sitting on folding chairs,
  lying down, children playing and people engaged in commercial, cultural, and physical
  activities.

- **Pedestrian diversity.** Women, children and the elderly may be more sensitive than others
  to street qualities such as comfort, safety and accessibility.

- **Social interaction**

- **Social network and ownership.** The degree to which a given street supports a strong
  social network has been measured in the number of friends people have on a given
  street. Another potential method is taking note of residents’ ownership of a street.

- **Public health.** Several studies have shown that people are less likely to be overweight if
  they live in more walkable areas. Other studies have shown that people who live in
  walkable areas are less likely to drive and thus less likely to contribute to harmful air
  pollution.

- **The Healthy Street:** traffic injuries, obesity, noise and air pollution, vehicle speeds, traffic
  volumes.
Political and organisational context
There is no better argument for embedding walking in the political context, than the “Ministry of Silly Walks” sketch from the Monty Python’s Flying Circus, (episode 14). Walking as a stand alone ministry or policy makes no sense.

A good political system needs to be aware that the needs of the pedestrian system should be embedded in all decision making. It should be a reflex to check the effect of decisions and measures on the pedestrian system. This may not require major legal changes or rules. It mostly requires awareness, which can be stimulated by initiatives such as the international charter for walking (Walk21).

The environmental context
Walking as well as cycling fit into a ‘zero’ tolerance for both energy consumption and emissions.

Impacts can be found at the following levels:
- global level: reduction of greenhouse gases and energy consumption,
- local level: reduction of equipment expenses, reduction of the environmental nuisances, improvement of the living environment and of the conviviality of municipalities,
- individual level: positive impact on health and on household finances, empowerment of the individuals composing the family unit.

These findings date from the seventies and eighties and seem trivial today. Moreover, they are also persistently repeated in most local mobility planning studies.

Steg et al. (2008, p 18, 19, 20) state that purely individual goods can readily be valued on the basis of their economic, emotional and social significance of the subject. The meaning and value assigned to collective goods are far more remote, because these goods are shared, extend beyond one’s own backyard and often have a significance far exceeding an individual lifetime.

The systems impact should be valued for the current and future situation (time horizon = 2040) = present (market) value, and for future (option) value. At this point the long term existence value (independent of human economic and/or social use) is not taken into account.

Methods for the assessment of non-market impacts, in particular on environment and health, are summarized in the EU Impact assessment guidelines (European Commission, 2005). Techniques have been developed to estimate the costs and benefits in money terms of goods that do not have a market value, describing the ‘willingness to pay’ or the ‘willingness to accept’ a particular outcome. They include Stated preference methods (contingent valuation, conjoint analysis, choice experiments) and Revealed preferences methods (travel cost method, hedonic pricing). Stated preference methods can be obtained by constructing hypothetical markets and asking people via questionnaires and interviews the value of a given outcome. These techniques have been used, for example, to value reduction in risks of premature deaths and non-fatal injuries, and existence value for the environment and historic buildings. Revealed preference methods are based on evidence from market transactions, for example the correlation of noise disturbance with house prices.

The technique of benefit or cost transfer (usually just called ‘benefits transfer’) can also be used to estimate values of impacts that do not have market prices. In this technique, values obtained in one study are transferred to a different study. For example, estimates of the costs of preventing a motorway accident in one Member State might be used to estimate the costs in other Member States. Using this technique increases the uncertainty of the estimated
values, but can be helpful to give an order of magnitude of likely impacts, or if there are time and money constraints. When valuing impacts, the proportionality principle applies, as in all parts of Impact Assessment: don’t devote a lot of energy to putting a value on non-marketed impacts if they are a very small part of the overall impacts.

**The International Charter of Walking (Walk21)**

The Charter shows how to create a culture where people choose to walk. The Charter may be signed by any individual, organisation, authority or neighbourhood group who support its vision and strategic principles regardless of their formal position and ability to independently progress their implementation. The charter identifies the needs of people on foot and provides a common framework to help authorities refocus their existing policies, activities and relationships to create a culture where people choose to walk. The charter is built on the following strategic principles:

1. Increased inclusive mobility;
2. Well designed and managed spaces and places for people;
3. Improved integration of networks;
4. Supportive land-use and spatial planning;
5. Reduced road danger;
6. Less crime and fear of crime;
7. More supportive authorities;
8. A culture of walking.

![Mindmap of Walk21](image)

**Figure 3 Mindmap of Walk21 representing “how we believe healthy, efficient and sustainable communities, where people choose to walk, can be achieved”**.

Under each strategic principle, actions are listed to provide a practical list of improvements that can be made in most communities. These may need adding to in response to local need and this is encouraged. The mind map of the charter can be interpreted as a graphic
representation of how to improve the self-correcting, self-healing and survival mechanisms which exist in the environmental, economical, social, political and organisational context.

3.3. How does the system help achieve ‘higher goals’?
A traditional interpretation of systems efficiency lies in the answer to the question: “Could the same or similar outputs be obtained more efficiently by other means. An industrial society presumes global standardised time and other units of reference relating to efficiency, costs and performance, and continuing aspiration for growth, improvement and betterment. But there are many cultures, and many aspects of life even in developed countries that do not ascribe to such industrial criteria (Dyer, 2002).

When dealing with ‘higher goals’, ethical considerations can not be ignored. We start with an a priori list of crucial dimensions, inspired a.o. by the Universal Declaration of Human Rights (United Nations, 1948). According to Nussbaum (2000), the ten capabilities which should be supported by all democracies are:

1. **Life.** Being able to live to the end of a human life of normal length; not dying prematurely, or before one’s life is so reduced as to be not worth living.
2. **Bodily Health.** Being able to have good health, including reproductive health; to be adequately nourished; to have adequate shelter.
3. **Bodily Integrity.** Being able to move freely from place to place; to be secure against violent assault, including sexual assault and domestic violence; having opportunities for sexual satisfaction and for choice in matters of reproduction.
4. **Senses, Imagination, and Thought.** Being able to use the senses, to imagine, think, and reason—and to do these things in a "truly human" way, a way informed and cultivated by an adequate education, including, but by no means limited to, literacy and basic mathematical and scientific training. Being able to use imagination and thought in connection with experiencing and producing works and events of one's own choice, religious, literary, musical, and so forth. Being able to use one's mind in ways protected by guarantees of freedom of expression with respect to both political and artistic speech, and freedom of religious exercise. Being able to have pleasurable experiences and to avoid non-beneficial pain.
5. **Emotions.** Being able to have attachments to things and people outside ourselves; to love those who love and care for us, to grieve at their absence; in general, to love, to grieve, to experience longing, gratitude, and justified anger. Not having one's emotional development blighted by fear and anxiety. (Supporting this capability means supporting forms of human association that can be shown to be crucial in their development.)
6. **Practical Reason.** Being able to form a conception of the good and to engage in critical reflection about the planning of one's life. (This entails protection for the liberty of conscience and religious observance.)
7. **Affiliation.**
   i. Being able to live with and toward others, to recognize and show concern for other humans, to engage in various forms of social interaction; to be able to imagine the situation of another. (Protecting this capability means protecting institutions that constitute and nourish such forms of affiliation, and also protecting the freedom of assembly and political speech.);
   ii. Having the social bases of self-respect and non-humiliation; being able to be treated as a dignified being whose worth is equal to that of others. This entails provisions of non-discrimination on the basis of race, sex, sexual orientation, ethnicity, caste, religion, national origin and species.
8. **Other Species.** Being able to live with concern for and in relation to animals, plants, and the world of nature.
9. **Play.** Being able to laugh, to play, to enjoy recreational activities.

10. **Control over one's Environment.**
    i. **Political.** Being able to participate effectively in political choices that govern one's life; having the right of political participation, protections of free speech and association;
    ii. **Material.** Being able to hold property (both land and movable goods), and having property rights on an equal basis with others; having the right to seek employment on an equal basis with others; having the freedom from unwarranted search and seizure. In work, being able to work as a human, exercising practical reason and entering into meaningful relationships of mutual recognition with other workers.

This list is not fixed, and can be adapted over time. The importance of this list, is that it helps framing the pedestrian systems output in a broader context. We will not further elaborate on the problems of measuring and indexing the contribution of the pedestrian system at this point, and propose it as a checklist to keep in mind whenever dealing with strategies and measures to improve the pedestrian system.

### 4. Conclusion

The key question for the assessment of the pedestrian system output is formulated as “What effects will (packages) of interventions have for the general stakeholder interests and/or for society in general?” Because the pedestrian system is a holistic, complex system, the answer is searched in a homeopathic system approach. The key question can be reformulated as: 1) “To what extent does the pedestrian system output improve the objective and subjective preconditions to fulfil the pedestrian needs?”, 2) “To what extent does the system improve (or at least not deteriorate) the self-correcting, self-healing and survival mechanisms which exists in the environmental, economical, social, political and organisational context?”, and 3) “How does the pedestrian system help achieve ‘higher goals’?”.

An answer to the first question is proposed by searching for feedback loops in the previous chapters dealing with Coherence and Integration. While evidence was found that the pedestrian system reinforces itself (the output stimulates the input), negative feedback could also be identified, and the feedback can be complex, in some cases positive for some pedestrians, and negative for others.

The second question leads us to the embeddedness of the pedestrian system in the environmental, economical, social, political and organisational context. Awareness appears to be a key issue. The International Charter of walking provides a common framework to help authorities refocus their existing policies, activities and relationships to create a culture where people choose to walk. The central idea is to stimulate healthy, efficient and sustainable communities where people choose to walk.

For the third question, instead of an answer, a list of dimensions is proposed, which helps framing the pedestrian systems output in a broader context. To conclude, rather than assessing the pedestrian system output, this chapter reflects about the principles and reasoning that underpin such assessment, and illustrates it with examples.
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Other related publications


Chaloupka & Risser, et al. HOTEL; How to analyse life qualityAn accompanying measure within the EU Fifth Framework Programme Keyaction “Improving the Socio Economic


Gaps in knowledge

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“You don’t know what you don’t know until you measure it”
'Science is what you know, philosophy is what you don’t know’
Bertrand Russell

Summary

In a comprehensive project such as PQN 358, it is almost impossible to summarise and describe all gaps in knowledge in the various parts of the project. Almost any topic covered, even those on which a considerable amount of knowledge exists, will have areas which are less well covered and on which additional knowledge would be helpful.

The current chapter attempts to highlight a number of issues which are felt to be critical for the provision of a high quality environment for pedestrians. The chapter touches upon issues related to the lack of appropriate planning models which take into account pedestrian movements, the allocation of space between pedestrians and motorized transport, missing information on infrastructure characteristics and their effects on pedestrian movements.

Related to safety there are major issues to be explored in connection with under-reporting of pedestrian accidents, pedestrian falls not being part of the general police reporting system, issues related to perceived safety.

Finally, tools that would assist politicians and decision-makers to find ways and budgets to improve the physical environment for pedestrians, including tools for economic analysis and tools for assessing joint benefits related to different fields of activity, including safety, health, the environment and quality of life.

1. Introduction

This chapter describes issues on which lack of data or knowledge is hampering research, planning activities and decision-making affecting the quality of life of pedestrians. Many of the issues were mentioned in the extensive literature review which was undertaken as part of the COST 358 project by Sombekke and Katteler (2008).

Till recently “pedestrian issues” were identified mainly with certain segments of society who could be considered “captive” pedestrians. They include the young, the old, the poor and some of the handicapped. If we seek a change in the quality of the environment and services for all pedestrians, the scope of attention should be widened to include also the pedestrians “by choice” and those other road users who could be induced to convert to the pedestrian

1 1872- 1970
mode. A design-4-all approach, currently promoted in architecture, urban planning and product design, would fit pedestrian needs as well.

2. Lack of data

Knowledge based decision-making depends on evidence which, in its turn, depends on good quality data. With regards to pedestrians there is a general lack of data in many areas. For example, in planning, design and decision-making for motorized transport, it is common practice to rely on survey data, which form the input for transportation models, which are then translated into detailed design projects. In contrast, planning for pedestrians often relies on unverified assumptions, intuition, traditional practices, or design fads.

2.1 Planning models and tools

Continuing the analogy from motorized transport, a whole range of planning models exist dealing with a variety of topics, such as origin-destination models, modal split models, assignment models, etc. All these models start with detailed data coming from travel surveys and network data.

For pedestrian movements a very limited number of models exist. For planning purposes good models need good data, which is lacking in most countries in the case of information on pedestrian trips. Willis et al (2002), describe a microscopic model of pedestrian movement (PEDFLOW), which can simulate the effects of environmental layout on how pedestrians negotiate the walking environment. More such quantitative models need to be developed.

A related issue is the under-representation of walking in trip surveys feeding into planning models. When information is collected in surveys on travel modes, walking might be included as one mode. In some countries where this information exists, it is estimated that some 25 percent of the trips are made by walking.

But walking is also part of almost all other trips conducted by cars, motorcycles, public transport or bicycles. Little is known on the extent of these movements, which are generally neglected in travel surveys. If it is the intention to move away from the car dependent society and shift trips to trips on foot or on bicycle it is important to obtain knowledge on these door-to-door trips. This plays a role in both evaluating the safety aspects of movement by different modes and assessing the effects of causing changes in the mode-mix.

2.2 Planning and land-use aspects

2.2.1 The allocation of space between pedestrians and motorized transport

Till a few centuries ago most urban public space belonged to the pedestrian, with a certain amount dedicated to horse-drawn vehicles. It was only with the introduction of the motor-vehicle that a slow process of degradation of the public environment for pedestrians started, ending up with pedestrians on sidewalks of ever decreasing width. It is only fairly recently, in some countries, that we can observe a counter trend, trying to establish a new balance between motorized and non-motorized traffic. The trend started with the concept of residential yards (woonerf; Home Zones in the UK) which started in the Netherlands in the 1970’s.

This form of shared space has been widely applied in many countries in Europe, in Australia and in some parts of the US and Canada and is well-researched regarding costs, impact on
A newer and somewhat related trend is the concept of “shared space”, sometimes also termed “naked streets”, whereby most of the traffic signs, traffic lights and forms of separation between pedestrians and motorized traffic are removed. Apart from the fact that this approach has many enthusiastic supporters and has been applied on a small scale in a number of locations, relatively little scientific evidence exists on the benefit of this approach and on the conditions where this can be applied satisfactorily. The concept should be studied and evaluated.

Another form of sharing is the combination of pedestrians and other modes of not-too-fast traffic on sidewalks. In countries that have considerable quantities of bicycle traffic, these are invariably assigned to their own right-of-way. However, in many countries it is customary to allow (officially or un-officially) bicycles to move on sidewalks. There is little research and evidence on the comfort and safety implications of this approach for either pedestrians or cyclists. Newer forms of transport are also appearing - Roller skates, skateboards, motorized wheel-chairs, electric carts (golf carts), kickboards, kick-bikes, variations of scooters, Segways and more. Some come with small motors and some are patched with motors “after market”. How to deal with all these movement assisting devices? Where to fit the mass produced bike with an electric motor that is targeted at a wide population?

The issue of allocation of urban public space to the various modes of transport- motorized and not motorized, including walking, is receiving more attention recently, but little knowledge exists on the right mix. In some of the newer design manuals for urban streets, one can detect a shift towards allocating more space for the walking and sojourning pedestrian, but little is said (or can be said based on evidence) about sharing space with pedestrians moving relatively fast on little machines that take more space in moving and also in resting position.

2.3 Infrastructure characteristics

When dealing with motorized transport, we have a generally good data base on the infrastructure network, especially so in many of the motorized countries. Such data bases include information on the road network (nowadays mostly GIS linked) and the characteristics of the network links and nodes (this exists in a varying degree of detail). This knowledge is then compared with detailed design manuals from which we can deduce which parts of the network are deficient, will be so in the future, need to be upgraded and development plans can be worked out.

When it comes to designing for pedestrians, we do not always have the required data bases with information on the road network characteristics, such as information on sidewalks, their widths, condition, street lighting, etc. The physical dimensions of footpaths & sidewalks, inventory of pedestrian facilities and street furniture need to be integrated into community’s databases, usually as a layer in a GIS. The techniques, devices and software for registering and documenting this information need to be developed.

In motorized transport, the concept of level-of-service is well developed and applied. It is generally linked to capacity of a road and traffic volumes. Similar tools are needed for pedestrian facilities, where the concept is not generally applied, except for specific functional applications such as public transport platform design, or emergency evacuation. Design for pedestrians usually follows guidelines of few classical architecture textbooks. The concept of LOS is relevant to sidewalks, pedestrian crossings, parking lots, bus terminals, shopping centres, etc.
There is still much argument in the literature about the relative safety of different types of crossing and whether and when crossings away from intersections should be signalized. As these locations are the main points of conflict between pedestrians and motorized traffic, more current data should be generated. Knowledge should be made available.

On the issue crossings, many new technological developments are coming on the marked, including motion (i.e. pedestrian) detectors, smart road studs that light up when pedestrians approach, warning devices for approaching drivers and other technologies. Most of these developments have not been independently assessed and it can therefore not been stated what their safety effect is.

2.4 Safety
One of the important aspects of pedestrians’ quality of life is, of course, pedestrian safety. Whereas the general number of pedestrian fatalities and casualties is generally registered in most countries in some detail, there still exist some serious problems associated with this reporting.

2.4.1 Under-reporting
Pedestrian accidents are the second most serious type of accidents which are under-reported (after bicycle accidents). The road accident data base, in most countries, is one established by the National Police and Central Bureau of Statistics. This database typically includes data on accidents with personal injury reported to the police.

In no country is the reporting complete, but it seems that for bicycle accidents, which involve many children, and for pedestrian accidents, under-reporting is more extensive than for other types of injured persons. Some ways exist to overcome these problems, including linking hospital record data to police report data, but such systems are not yet in widespread use. This field needs serious attention and needs to be developed.

Another form of under-reporting that mostly affects pedestrians is about pedestrian falls on public right-of-way. A recent study by Kormer and Smolka (2009) estimated that every year there are 1.6 million pedestrians injured due to falls on public roads in the EU (taken from Feypell (2010)). Another recent study from the Netherlands (Methorst et al (2009), found that one third of all pedestrian fatalities in the Netherlands were due to falls and that 80 percent of pedestrian injuries were due to falling. Such under-reporting seriously distorts the available data and thus biases decision-making.

2.4.2. Lack of Exposure data about pedestrians
Risk is the rate of accidents per unit exposure. Whereas for motorized transport we have a fair amount of information on traffic volumes at road sections and intersections, such information is totally lacking for pedestrian ‘travel’ or presence on roads, streets, near junctions, on crosswalks. Only very local and sporadic counts are sometimes made of pedestrians’ movement at signalized junctions, where the movements are constrained in space and time. We don’t even have the methodologies to count pedestrians in a standard and representative way for a street or a network of streets. Therefore, for the most part, we don’t have the denominator to be considered ‘Exposure’ in calculating relative risk indicators for pedestrian on any part of the road, such as crosswalks, junctions, a given street, network. Even assuming we have such exposure information, few models exist on the right risk measures for pedestrians crossing roads, or waking in general.
3. Perceived Safety

Perceived or subjective safety can have an influence on individual behaviour as a motorist and perhaps even more as a pedestrian. Most people will avoid unfamiliar dark streets, or what looks as deserted public space. Objective safety (or security) may not perfectly match the subjective feeling, of course. Research should identify the higher level infrastructure features that increase the sense of safety and good feeling for a walking and sojourning person. It seems that the simple ergonomic issues are known, but their relative importance and interactions are less understood. Orientation, network connectivity, technology assistance and their impact on subjective safety are examples of issues worth studying.

Car marketing also appeals to perceived safety by advertising and enhancing what objective facts it can bring to the attention of customers. Media plays an important role as well in framing safety issues and determining their (often short) prominence in the mind of people and also decision makers. How is this affecting waking? How the power of media can be used to increase walking and the safe conditions for it? Do decision makers perceive safety differently than the general public? A study of political decision makers in Finland found that they had similar views on safety and on traffic law enforcement as did the general public. Perhaps media and personal experience affect us all in a similar way.

4. Needs

A considerable part of this study deals with the definition and description of needs. Needs exist on a number of levels and include existential needs, strategic needs, tactical needs and operational needs. Furthermore, there are objective needs and perceived needs. Needs on the existential level depend on urban/rural lifestyles, household characteristics, employment, culture and structure of society. Information on these needs and on the strategic needs does hardly exist in the literature and more research is needed. On the tactical and operational levels much more information exists.

Two additional factors which influence a person’s decision to walk and on which there is a general lack of good information is a quantitative approach to a definition of convenience and comfort when walking and sojourning.

On the tactical and operational levels, generally much more information exists. A problem here is that there are very few or no existing manuals which contain this information in an organized manner, similar to road and highway design manuals, or manuals for the design of public transport and terminals. Availability of such manuals would make the information much more accessible to planners and designers of facilities.

Levels of satisfaction play a role in the decisions people make to walk instead of using motorized transport. Such levels are difficult to measure and surveys do not always provide the correct answers. Techniques need to be developed and applied to obtain information on levels of satisfaction of different kinds of road users, as applied to a variety of circumstances.

5. Economic analysis

As part of the decision-making process, in transportation planning standard economic tools have been put in place to assess the economic value of intended projects. Most countries
have developed their own procedures, such as COBA in the UK; the World Bank uses a Highway design and maintenance model, another technique is MicroBENCOST.

These procedures calculate the monetized value of vehicle-operating cost savings, safety benefits and travel time savings from road or transport improvements. Some of these models associate a higher value of time for driving than for walking, which is questionable. No values are generally assigned to fitness, health, pollution and aesthetic benefits. Apart from the fact that these procedures inherently skew the benefits towards motorized transport, there are also no equivalent procedures in place to similarly value walking schemes.

One of the few studies on the costs and benefits associated with walking and cycling was conducted by Elvik (2000). Elvik calculated that the generalized costs of travel are assumed to drop from 15 to 12.5 NOK per kilometre for pedestrians. This decline in generalized cost is assumed to induce a traffic increase of 20 pedestrians a day. It would also result in 25 children who would no longer require a bus ride, thus achieving further benefits. A further associated benefit would be a reduction in absence from work, due to increased physical health of workers. Elvik explains that he does not envisage an increase in accidents.

Knowledge on the economic benefits of walking, including improved health and environmental aspects is very important for decision-makers and further work in this area is needed. Such calculations should take into account and quantify the many different benefits associated with walking and walkability.

6. Tools for decision-makers and politicians

As a tool for decision-makers, for road and transport schemes, including public transport bus and rail transport, appraisal systems have been put in place that measure the costs and benefits associated with such schemes. Such schemes generally include monetary evaluations of improvements to quality, such as comfort, reliability and security. For walking, no such equivalent tools have been developed.

Heuman et al (2005) developed tools for associating economic values to pedestrian improvements, through the use of stated-preference techniques. The kind of techniques developed for associating economic costs and benefits to pedestrian schemes and projects can have significant impact on the quality of decision-making. Their model, named WAVE, which was developed to place money values on quality benefits for pedestrian walkways, could be applied on a wider scale and could possibly be adapted to the evaluation of other pedestrian schemes.

Litman (2007) suggests a number of economic impacts associated with walkability schemes and which should be assessed before decision-making. These include accessibility, consumer cost savings, public cost savings, efficient land-use, liveability, public fitness and health, economic development and equity.

A recent European report describes indicators tracking transport and environment in the EU (European Environment Agency, 2010). In the chapter on transport greenhouse gas mitigation options (Chapter 8), it describes policy instruments for reducing emissions.

Policies which feature prominently include: higher density mixed use developments with more opportunities for non-motorised transport, travel planning with measures to influence travel behaviour, again providing more opportunities for non-motorised travel. The range of regulatory measures offered deal with traffic management, shifting focus and priority to non-
motorised transport. While all these suggestions are sensible and worthwhile, there is a lack of tools which could be used to achieve these goals.

A related issue is how to get good schemes implemented; how to increase the willingness of authorities to invest in such schemes? What rewards do politicians and decision-makers get for improved quality of the pedestrian environment. Road schemes that benefit the motorist can generally rely on creating support from the influential motorized public. For pedestrian schemes it is more difficult to create similar support at the municipal and national levels. The elderly are, as yet, not an organized lobby, neither are children. Tools that point out the benefits of improving pedestrian quality, including the economic tools described in the previous section are in dire need.

7. Promising interventions

In their report ‘Pedestrians: needs, facilities and interventions', Sombekke and Katteler (2008), dedicate a whole chapter to promising interventions they collated from research literature, national safety programmes and EU funded research. The interventions cover a whole range of actions on the strategic, tactical and operational levels, covering infrastructure treatments, education, training, enforcement, policy and planning.

In another part of the current project, Dell’Asin (2009) covered a wide range of interventions and measures to improve the quality of urban areas. She also described practices in 20 cities in Europe, termed “pedestrian-friendly” cities, and pointed out the features that made those cities pedestrian friendly. A considerable number of EU and OECD funded projects have also touched upon these issues. Among these projects can be mentioned PROMISE, PROMPT, WALCYNG, ADONIS, CIVITAS, COST action 6, VRU-TOO and OECD (1998).

8. Acknowledgements

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Conclusions with regard to innovation of PQN policy development

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‘Optimal solutions do not always exist’
Batchelor & Whelan

1. Introduction

The main objective of the COST 358 Pedestrians’ Quality Needs project was to innovate policy development thinking and to show how policy development can be taken to a higher level. It was assumed that a systems approach, as introduced for other fields like road traffic safety, and health promotions, could also be developed for improving walking and sojourning conditions. Thus the project aimed to show the added value of a systems approach to improvements for walking and sojourning.

The problem is, however, that such an approach is not yet fully developed and implemented. Therefore, by definition, the added value cannot be shown. The PQN project offers a first sketch of such an approach. In the PQN Final Report part B Documentation – section 5 ‘Policy process’, the state of affairs with regard to the documentation of the subsequent steps within a systems approach is pictured. In this paper an indicative SWOT analysis of the PQN systems approach is made. This analysis may be helpful for future projects.

2. SWOT analysis

Strengths
- A large interdisciplinary group of 70 dedicated researchers from 20 COST countries joined forces to exchange and acquire knowledge on the issue. This strength was amplified by concerted action with the OECD/International Transport Forum working group on Pedestrian Safety, Urban Space and Health (PUSH), WALK21 and the International Co-operation on Theories and Concepts in Traffic safety (ICTCT). Together this delivers credibility of the project’s results.
- The PQN systems approach conceptual framework was developed, intensively discussed and generally applied throughout the PQN project. Strengths were identified. Weaknesses were mitigated and opportunities to apply and improve it were seized. The PQN framework also functioned as point of departure for the OECD/ITF PUSH group.
- Whilst earlier approaches to the pedestrian issue relied heavily on specific policies like traffic safety, urban design, health promotion or school child protection, the PQN project started consistently from the pedestrian and his needs, abilities and from deficits in the system that made walking or sojourning difficult. The principle is that the system should adapt to serve mankind and not the other way around.

1 1994
The PQN conceptual framework helped to acquire better insight in the pedestrian system and widened the participant's perspective in several ways. During the project the original process design was improved on a number of points.

To support internal and external communication a Glossary of applied concepts was compiled. Such a Glossary promotes uniform use of terms and helps to prevent misunderstandings.

The PQN project combined and highlighted new insights. It appeared that the magnitude of some important issues differs substantially from what is known from common, traditional studies, the media and public emotions. Examples are: more pedestrians suffer severe injuries from falls than from collisions with cars while crossing the street; walking to and from other modes takes about as much time in public space as walking from door to door; sojourning in public space is very important for city life.

The PQN project made it clear that the pedestrian issue is much more complex than usually assumed and perceived. It also proved very difficult to substantiate the 'discoveries' because there is a real data availability and reliability problem.

The PQN studies delivered basic data and estimations of the magnitude of the issue, which were not known before. The project underlines that knowledge is the key to improvement.

The PQN system approach, much more than reactive approaches, offer prospect of effective, efficient and durable quality improvement for pedestrian.

The PQN systems approach can easily be translated to other issues. The policy process design and methodological aspects do not uniquely apply for the pedestrian issue, but can be used in other processes as well.

The PQN systems approach covers more options than traditional approaches and the subsequent intervention programs probably offer more value for money. It helps to prevent one-sided approaches. It helps identifying weak links. The Cascade principle acknowledges that in many cases problems can be best prevented by 'higher level' measures.

The object is not only to improve conditions for pedestrians, but to support the improvement of the system as a whole, without negative effects for the wider system.

Weaknesses

The PQN project leans on a relatively small forerunner group of experts contributions. The field is still new and lacks the seniority of other fields.

The time span of the project was fixed to 4 years. Within that time frame it is not possible to completely cover such a complex issue (if ever). Some inconsistencies in definitions and conclusions, incomplete coverage of certain aspects of the issue remain.

Ideally the PQN Working Group 4 Integration and Coherence, the working group that most intensively dealt with policy development, would have drawn from the results of the more technical Working Groups 1, 2 and 3. The latter Working Groups needed the full time frame to study their issues; Working Group 4 depended on intermediate results and their own expertise. The final integration has to be taken up at a later stage.

Regarding policy program development it is more or less assumed that the necessary preconditions for this are met. In practise this is far from realistic. In the majority of cases knowledge about the pedestrian problems and their remedies is absent; the political will to invest in quality for pedestrians is just emerging; most often practitioners simply do not have the time or budgets for proper orientation on the state of affairs, improvement options. When there is money for implementation, there seldom is opportunity for evaluation of the measures etc.

2 Admittedly, these issues were not discovered by PQN research but by separate other experts.
The PQN project did not come round to study implementation of measures. There is no insight in what is required for implementation, how the quality of implementation can be checked and balanced. This needs to be tackled in future projects.

The PQN systems approach does not comply well with the dominant political feeling that the pedestrian issue is best dealt with by an integrated approach and by lifting along with other measures and policy programs. Although there are good arguments to keep some distance from this strategy, it does not make it easier to get things done.

A political weakness is that the Design for All and PQN systems approach will benefit specific ‘weak’ groups, like children, the elderly and the handicapped mostly and not so much the ‘common’ and relatively powerful voters like young adults.

A weakness regarding policy development and implementation is that political rewards are relatively small and mostly concern ‘the feeling of doing the good thing’. Up till now enacting pedestrian policy programs did to yield rewards like additional voters budgets.

In many municipalities a ‘Bleeb system’ is applied: whenever a citizen has a complaint, the municipality takes action to tackle the problem, and only that exact problem. The action does not affect policy in a wider context. The Bleeb System is applied because it is cheaper than methodical approach like the PQN systems approach.

The PQN systems approach offers a long term perspective. On the short term it costs more than pathological or reactive policy strategies. Policy development takes up energy, time and money. The real profits come only in the last stage of the process; in the first stages there are only expenses. Real success will only come when there are proper investments made in knowledge acquisition/building, a good organisational structure and other preconditions provided.

The PQN system approach suits national level policy making better than local level policy making. It means that one has to give in to larger schemes and higher order developments and determinants. On the local level approaches are preferably more focussed on doing, short term results and rewards, not so much on long term, structural results.

Implementation of a systems approach presumes beforehand that the authority possesses a high level of knowledge and insight in the issue and what quality can and need to be improved. This is not self evident.

**Opportunities**

- Knowledge is the key to improvement. In the PQN project documentation ample indications can be found for the improvement of preconditions and target setting, analysis, effective measures and policy development.
- Individual measures are seen in a wider perspective and more easily connected to other policy aims.
- Negative side effects are spotted earlier, so that countermeasures can be taken.
- Measures will be (much) more effective and cost-efficient; costs and loss-of-face by failures will decline.
- It is clearer what measures have to be planned on the short and long run.
- It is clearer what the benefits of providing for walking and sojourning are. This can help improving the authorities’ relations with its citizens, decrease in unexpected expenses on emergency measures, less complaints etc.
- Systems approach is relatively easily translatable into an interactive systematic, rational expert system on the computer, because of its stepwise process. This will make it easier to disseminate and be helpful as just-in-time-knowledge.
- Facilities for walking and sojourning are collective goods. Steg & Vlek (2009) state that meaning of value assigned to collective goods is far more remote, because these goods are shared, extend beyond one own backyard and often have a significance far
exceeding an individual lifetime. Systems approach makes can help making citizens aware of this fact.

- There are many problems that can be solved by promoting and supporting walking and sojourning conditions. For example: currently many school children are driven to school, taking up escorting time, money and energy that can be better spent. By walking obesity and many serious disorders can be prevented; by taking care that the elderly can find their services in proximity, they can function independent until high age, without costs to society for transportation of goods and assistance.

- A systems approach delivers policy consistency. The better the system analysis, the better it yields. It can also deliver a guiding vision, that helps communicating and promoting change.

- The better you do stage 1 (vision) and stage 2 (analysis), the better the programs will be.

- Lifting policymaking and implementation above the ad-hoc and sectoral approaches.

- From the PQN Country Reports it is clear that some authorities still function at the Pathological policy maturity level, where in fact walking and sojourning facilities at the management level are not considered. The majority of governments function at the Reactive policy maturity level, where walking and sojourning is seen as ‘important’ and that measures will be considered whenever they receive serious complaints. A small minority will function on the Calculative policy maturity level, and have systems in place to manage all hazards: when the expected sacrifices for taking action do not exceed the expected short term benefits for the organisation as a whole. In all those cases the proposed the proposed systems approach will have added value.

**Threats**

- The approach calls for a lot of knowledge and insight and a rather mature organisation. In the current economic depression governmental organisations have to cut down costs and lay of staff. This is not a good climate for asking for money to attract or educate practitioners to develop new policies.

- Demographic developments are virtually unstoppable. There might not time enough to invest in the development and implementation of structures to support the independent mobility of the elderly.

- Ageing of the population will probably lead to less tax income for governments.

- A population’s growing car dependency gives rise to demand for additional transportation facilities, which goes at the expense of budgets available for walking.

- Urban sprawl thins the use of public space and pedestrian facilities in particular, making its use less visible and more difficult to maintain economically, because it will cost more per inhabitant, while the public space authorities’ budgets will decrease.

- Because society is increasingly complex, many people find it difficult to keep up with the complexity of the governmental policies. They ask for simpler explanations; populist politicians offer these. A systems approach does not connect well to populist views. Its message is too complex to be taken up.

**3. Conclusions**

- The PQN systems approach is not so much an alternative approach, but an Ad-on or advancement of the more basic reactive and calculative approaches.

- Regarding the development of the PQN systems approach, we are not there yet. The PQN systems approach is a ‘vision’ and ‘ideal’ but not yet practise. Still a lot of work has to be done to solve practical policy development and implementation issues, to simplify
the approach into a mature strategy and document its added value in comparison with current strategies. There still are many question marks. However, there seems to be quite a bit of drive for follow-up projects. The main issue will be how to proceed from knowledge to implementation?